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VOLUME 140 NO. [illegible] MARCH 3 1967 ONE SHILLING

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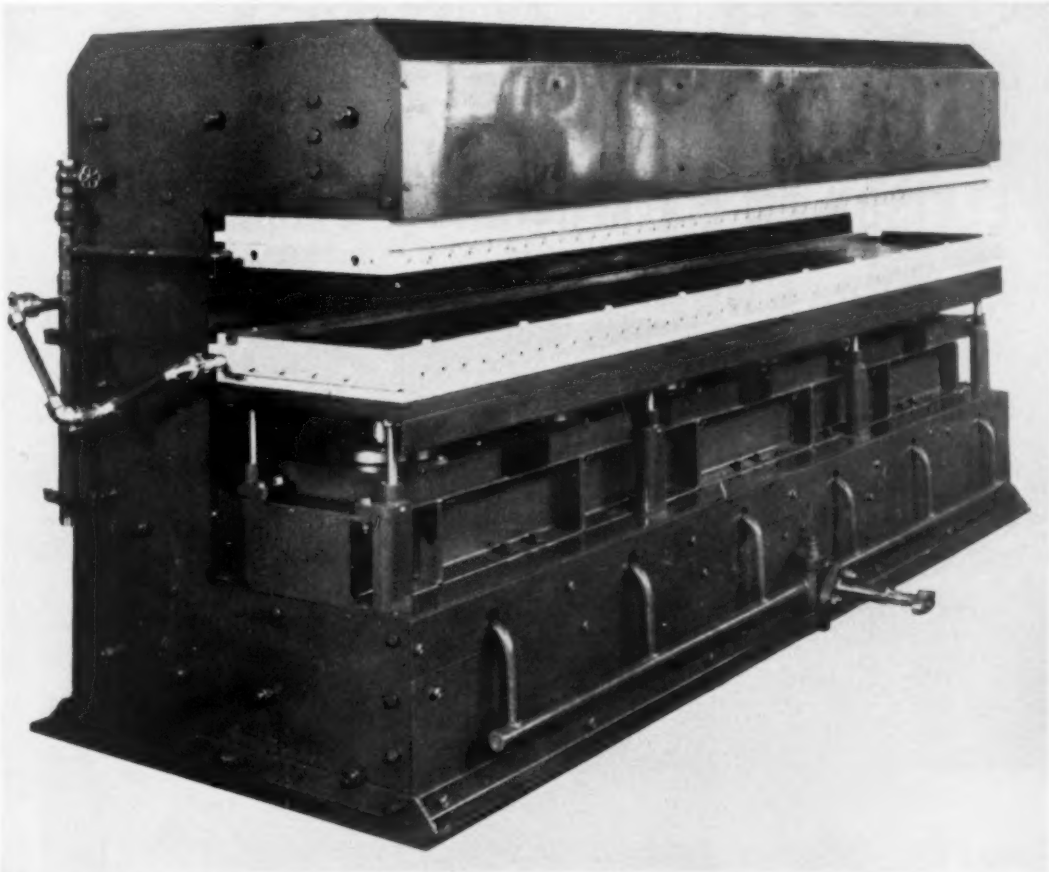

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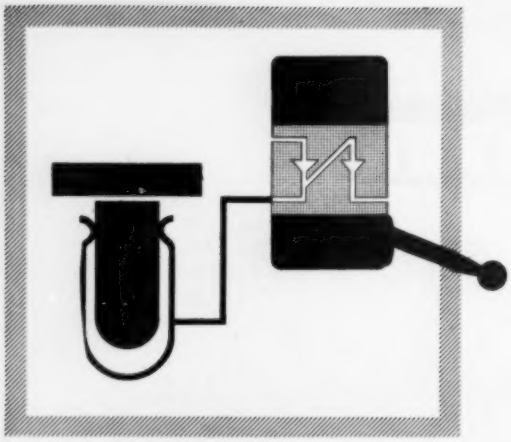

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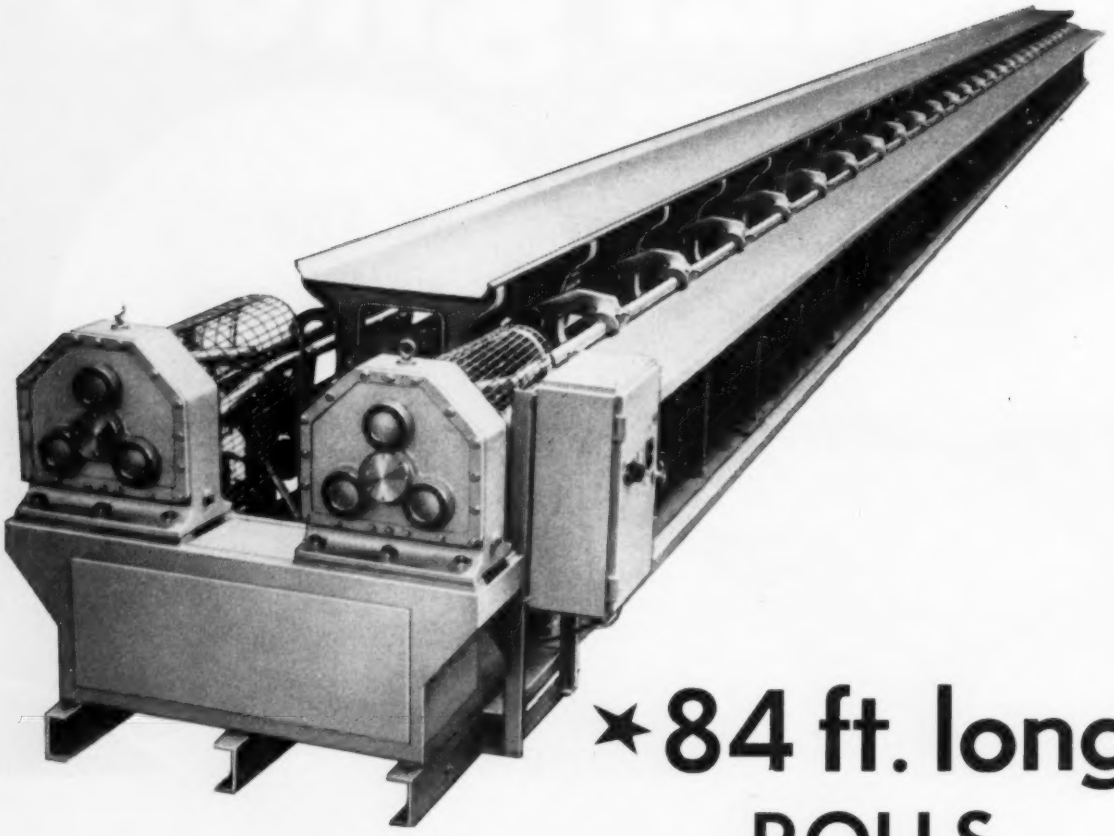

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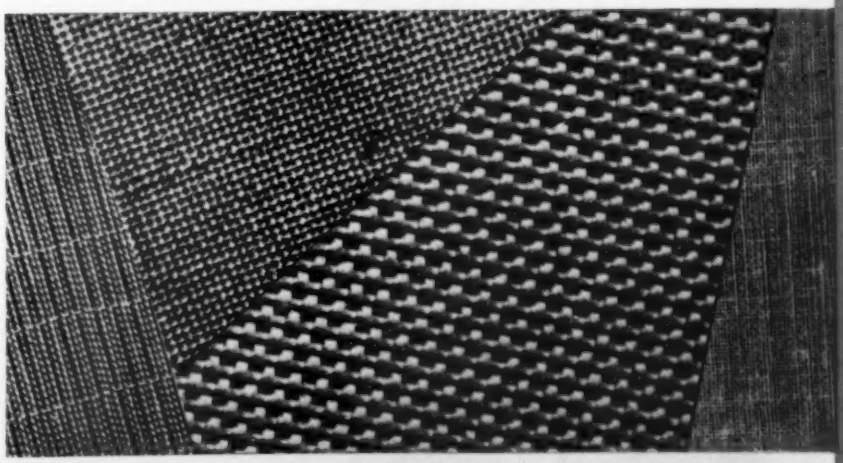

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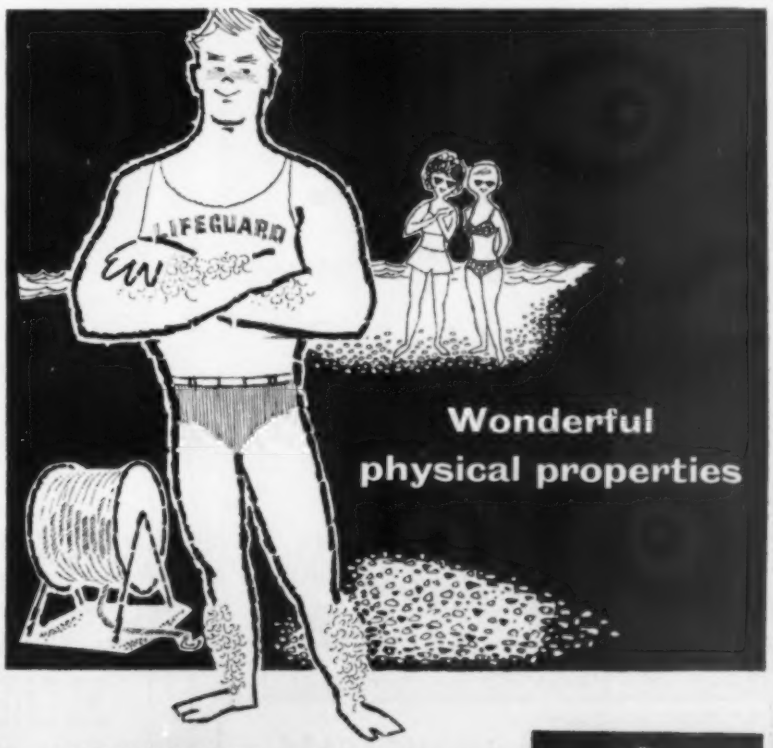

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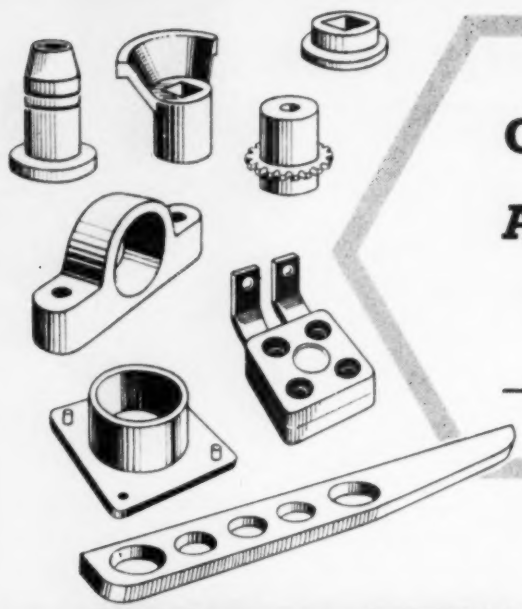

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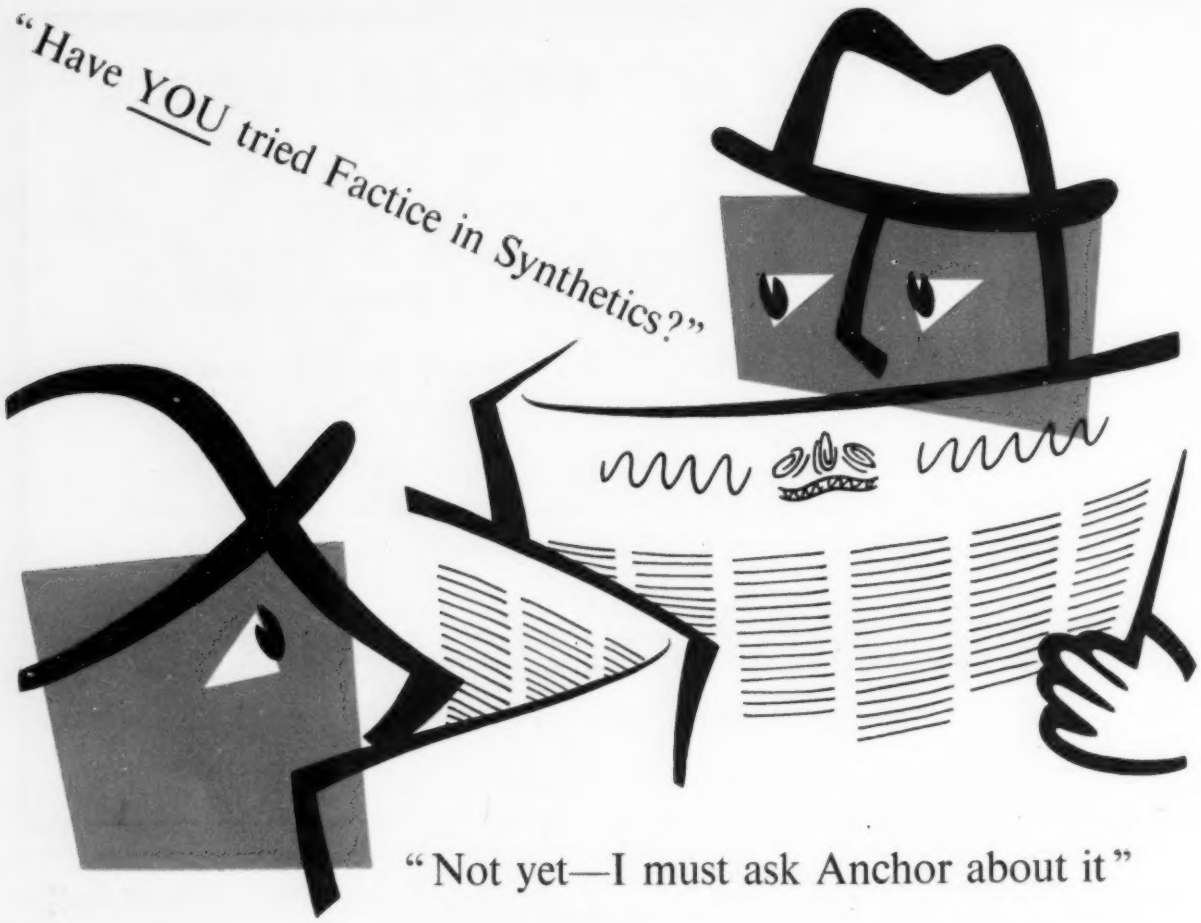

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RUBBER and PLASTICS WEEKLY

Formerly 'Rubber Journal and International Plastics'

Volume 140 *IN ITS 77th YEAR* **No. 10**

March 11 1961

Editorial

NOTES OF THE WEEK 375

Articles and News

NEWS BRIEFS 376
MORE I.C.I. ACTIVITY 378
1960 PLASTICS SALES 12% UP 379
ACCELERATORS AND ANTIOXIDANTS FOR RUBBER ... 380
RUBBER AND PLASTICS IN CABLES 387
COLOURS AND COATINGS 398

Features

VIEWS AND REVIEWS 392
MEN AND MATTERS 394
THE LEGAL ANGLE 397
RUBBER STATISTICS 400
RUBBER MARKETS 402
INDUSTRY INTELLIGENCE 403
FUTURE EVENTS 404

Classified Advertisements . . . 405 Advertisers Index . . . 408

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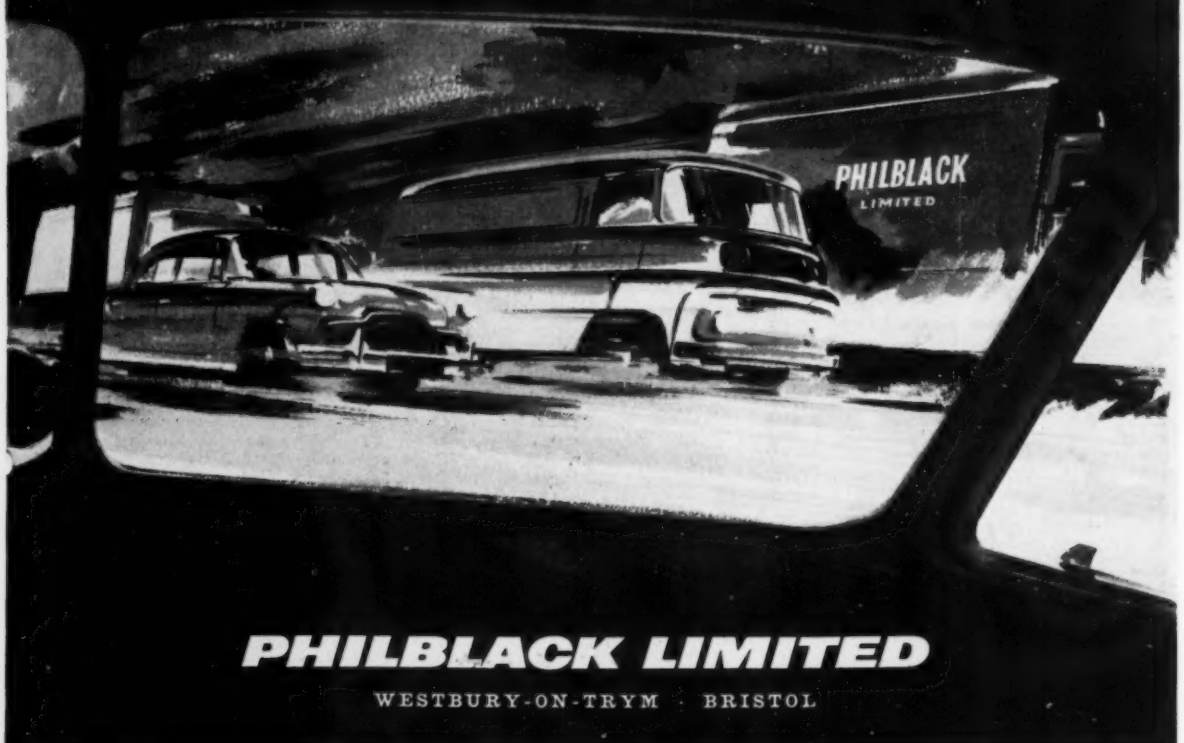

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NOTES of the WEEK

Fundamental Research

THE outstanding paper at the joint conference on rubber and plastics in cables,* organized by the Institution of the Rubber Industry and the Plastics Institute, was the one given by W. L. Hawkins, Bell Telephone Laboratories Inc, USA. The other papers were generally useful and well delivered, but some of them suffered by comparison. They seemed to be the result of research work tied so tightly to a sales programme that any originality, any interesting side-issues, tended to be squeezed out. This is a common fault of many papers delivered at conferences and symposia, and our criticism is a perfectly general one, not simply levelled at this particular symposium. It is only when one comes across a paper like Mr Hawkins's that the fault becomes so marked and calls out for comment.

His paper dealt with the stabilization of plastics insulating materials for wire and cable, and described the results of some *fundamental* research carried out to explain the antioxidant properties of carbon black. While this is obviously of considerable importance to a large number of rubber and plastic users, it is equally obvious that the research programme was not started with the object of immediate commercial results.

A Brutal Question

THE Bell Telephone paper reminds us forcibly of certain passages in William H. Whyte's 'The Organization Man'. Whyte asks what he calls 'a brutal question': how good are the scientists in the large American corporations? He quotes a survey carried out on young scientists, which set out to obtain nominations of men under forty in both industry and the universities. Foundations and such government agencies as the Office of Naval Research and the Atomic Energy Commission were asked to name scientists who, in their opinion, were carrying out work of outstanding quality.

The results were startling. Only four out of 225 names nominated were those of men in industry. Fearing that this sample was too biased, the survey went on to canvass directors of leading corporation laboratories. It also asked leading academic scientists to think of scientists in industry and name any they thought to be of top rank. This effort produced only another 35 names. Among all the nominations two laboratories stood out: those of Bell and General Electric. The chemical industry — the industry that has spent more money on research than any other — fared particularly badly.

Whyte comments that out of all the corporation research groups Bell and General Electric are precisely the two firms that believe in 'idle curiosity'; instead of demanding that the scientists apply themselves exclusively to practical problems, they often let them go after the basic problems they want to follow.

The Pull of Curiosity

A LARGE number of really significant developments in polymer chemistry have been made by following the pull of 'idle curiosity', or by the inspired following-up of a 'lucky' accident. Carrothers did not set out to make nylon; the material was a by-product of fundamental work on molecular structure. In last year's Foundation Lecture of the Institution of the Rubber Industry, Maldwyn Jones, commenting on the developments in polymer chemistry over the last 30 years, said: 'It is difficult to unravel any set pattern, but it seems that very few polymers were the result of attempts to produce a material with given properties, but were rather the discoveries of people working in the field of chemistry, such as nylon and neoprene. Polythene was discovered by I.C.I. chemists working on the effect of high pressure on chemical reactions and when a white powder was produced its significance as a plastic was not at first realized. Zeigler's development of low pressure polymerization of ethylene was not the result of an attempt to solve a set problem. Terylene, on the other hand, was the result of a set programme of research in an attempt to fill in gaps in the work of Carrothers'.

Creative Workers

THE policy of 'idle curiosity' clearly pays immense dividends, and it pays them, paradoxically enough, from a commercial as well as a scientific point of view. Let us be quite clear in saying that scientists are employed by a company to further that company's aims. But scientists are creative workers, not filing cabinets. The best results — both from the company's and the entire industry's points of view — are not always obtained by keeping them on a tight commercial rein.

*Reported on page 387

NEWS *Briefs*

JAPANESE DIENE PLANS — INDIAN POLYTHENE PLANT OPENS—HUNGARY 'OPEN PLANT' SCHEME POLISH PLASTICS — US STYRENE PRICE CUTS

●**Japan** — Japanese Geon Co. is negotiating with B. F. Goodrich for techniques of manufacturing cispolybutadiene. Three other Japanese firms including the Asahi Chemical Co., the Bridgestone Tyre Co. and Ube Kosan Kaisha have been reported to be planning production of the stereo-rubber under technical tie-ups with foreign producers.

●**United States** — The Monsanto Chemical Co. in USA has reduced the price of styrene to 11 cents per lb. fob plant. Previously, the price was 12.59 cents per lb. delivered. Trade sources said the reduction in the price of styrene might not have any appreciable effect immediately on the price of SBR, but the surplus supplies of SBR might force a price reduction eventually. Koppers Co. Inc. has followed Monsanto by reducing its two grades of styrene by about 10%, and other concerns are expected to follow suit.

●**Turkey** — The International Co-operation Administration in USA has announced that it has authorized Turkey to purchase $4.7m. worth of rubber and rubber products from various world-wide sources. Contracting periods range between now and October 31, and the terminal delivery date is February 28 1962.

●**Poland** — A unit at a large chemical complex at Pulawy, based on natural gas, will produce acetylene for the manufacture of plastics.

●**Burma** — Malaya will sign a trade agreement with Burma, the Assistant Minister of Commerce and Industry said in Rangoon this week. He said the Malayan Government would give full co-operation in the development of the natural rubber industry of Burma.

●**United States** — Contracts totalling $2,162,067 have been awarded B. F. Goodrich Aviation Products. They cover aircraft fuel cells, tyres for the Air Force B-52 bomber and miscellaneous Navy aircraft, aircraft brake parts, and electrothermal anti-icing systems for the 'Hound Dog' nuclear air-to-ground missile.

●**Brazil** — Imperial Chemical Industries Ltd. has agreed to grant to Companhia Brasileira Rhodiacéta, a subsidiary of Société Rhodiacéta, France, exclusive patent rights for the manufacture in Brazil of its Terylene polyester fibre. Société Rhodiacéta manufactures polyester fibre in France under the trade name Tergal.

●**United States** — Tennessee Oil Refining Co., a division of the Tennessee Gas Transmission Co., will use Cosden Petroleum's ethylbenzene separation process at a plant to be built at Chalmette, Louisiana. A licence for the process has also been granted to the Suntide Refining Co.

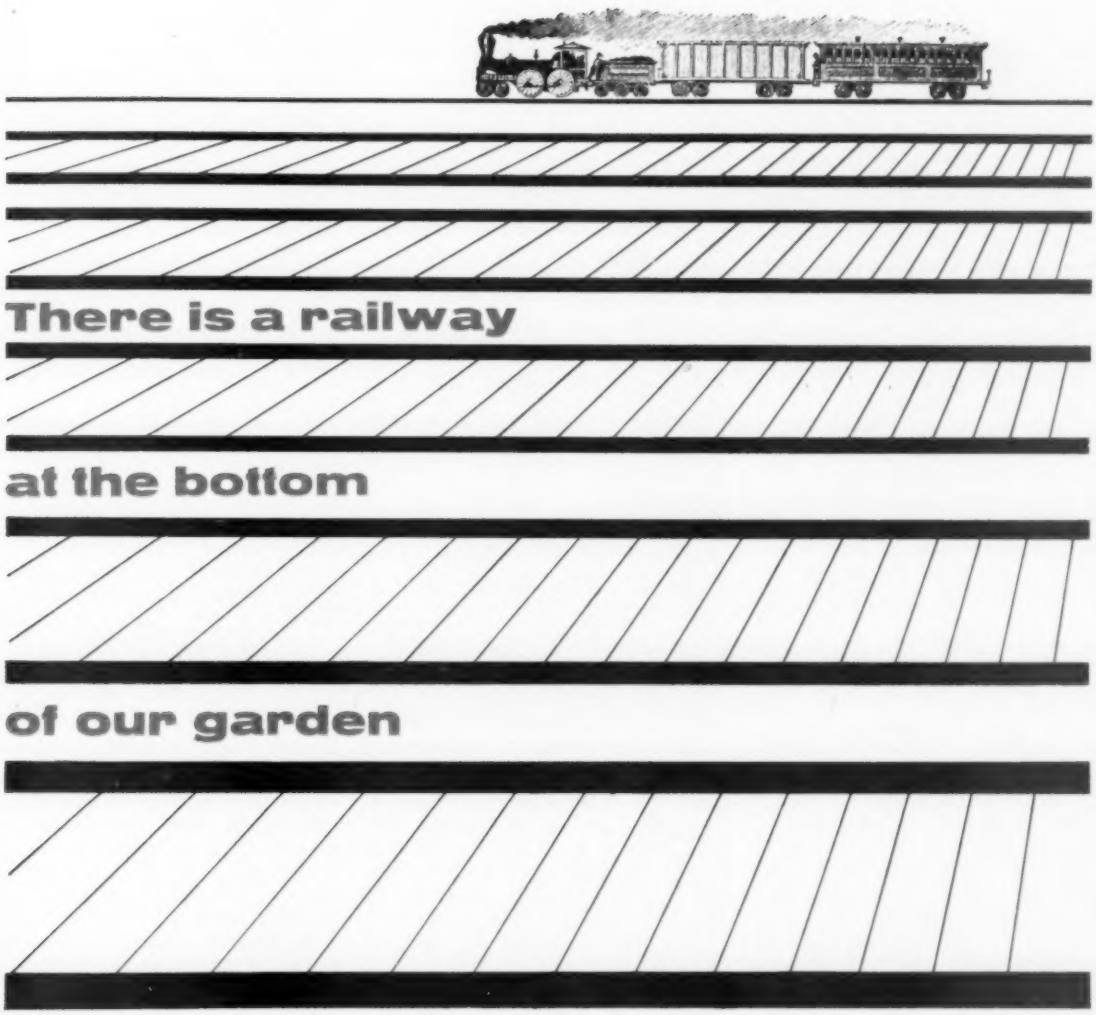
●**Hungary** — A number of installations scheduled under Hungary's latest chemical industry building projects are to be sited in the open, according to a recent Government order. An instruction urges planners to place within buildings 'only those chemical industry installations the operation, maintenance and life-span of which makes it absolutely necessary'. It lists as suitable for open-air siting: 'Various ovens, cooling machines, vulcanizing boilers for the rubber industry, autoclaves, fermenters, heat exchangers, grinders and mills'. A spokesman for the chemical industry said that 42% of present investments were taken up by building costs. If certain machinery could be placed outdoors, cost of buildings would be reduced to 33% of the investment programme.

●**United States** — The Goodyear Tire and Rubber Co. and the Firestone Tire and Rubber Co. will open new contract talks with the AFL-CIO United Rubber Workers' Union on March 20.

●**India** — The new plant which Union Carbide India Ltd. has set up at Trombay is now ready to go into production. Manubhai Shah, Union Minister of Industry, will perform the opening ceremony today (March 11). The plant has been completed at a capital cost of Rs.4.5 crores (£3.4m.) and will produce annually 15m. lb. of chemicals and polythene resins and compounds, valued at about Rs.2.5 crores (£1.9m.).

'OK Mister Wise Guy Goodyear — so you've cooked rubber in sulphur — so it'll maybe taste better—so what?' — 527

●**East Germany** — Negotiations between the Federation of British Industries and the Chamber of Foreign Trade of the German Democratic Republic on the bilateral trade arrangement for 1961 have resulted in a £4m. increase over last year's agreed total volume. The UK's export quota for chemicals is £400,000, and for machinery £200,000. New items on the UK import list include tyres and tubes for racing cycles.



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NEWS *Briefs*

JAPANESE DIENE PLANS — INDIAN POLYTHENE PLANT OPENS—HUNGARY 'OPEN PLANT' SCHEME POLISH PLASTICS — US STYRENE PRICE CUTS

●**Japan** — Japanese Geon Co. is negotiating with B. F. Goodrich for techniques of manufacturing cispolybutadiene. Three other Japanese firms including the Asahi Chemical Co., the Bridgestone Tyre Co. and Ube Kosan Kaisha have been reported to be planning production of the stereo-rubber under technical tie-ups with foreign producers.

●**United States** — The Monsanto Chemical Co. in USA has reduced the price of styrene to 11 cents per lb. fob plant. Previously, the price was 12.59 cents per lb. delivered. Trade sources said the reduction in the price of styrene might not have any appreciable effect immediately on the price of SBR, but the surplus supplies of SBR might force a price reduction eventually. Koppers Co. Inc. has followed Monsanto by reducing its two grades of styrene by about 10%, and other concerns are expected to follow suit.

●**Turkey** — The International Co-operation Administration in USA has announced that it has authorized Turkey to purchase $4.7m. worth of rubber and rubber products from various world-wide sources. Contracting periods range between now and October 31, and the terminal delivery date is February 28 1962.

●**Poland** — A unit at a large chemical complex at Pulawy, based on natural gas, will produce acetylene for the manufacture of plastics.

●**Burma** — Malaya will sign a trade agreement with Burma, the Assistant Minister of Commerce and Industry said in Rangoon this week. He said the Malayan Government would give full co-operation in the development of the natural rubber industry of Burma.

●**United States** — Contracts totalling $2,162,067 have been awarded B. F. Goodrich Aviation Products. They cover aircraft fuel cells, tyres for the Air Force B-52 bomber and miscellaneous Navy aircraft, aircraft brake parts, and electrothermal anti-icing systems for the 'Hound Dog' nuclear air-to-ground missile.

●**Brazil** — Imperial Chemical Industries Ltd. has agreed to grant to Companhia Brasileira Rhodiacéta, a subsidiary of Société Rhodiacéta, France, exclusive patent rights for the manufacture in Brazil of its Terylene polyester fibre. Société Rhodiacéta manufactures polyester fibre in France under the trade name Tergal.

●**United States** — Tennessee Oil Refining Co., a division of the Tennessee Gas Transmission Co., will use Cosden Petroleum's ethylbenzene separation process at a plant to be built at Chalmette, Louisiana. A licence for the process has also been granted to the Suntide Refining Co.

●**Hungary** — A number of installations scheduled under Hungary's latest chemical industry building projects are to be sited in the open, according to a recent Government order. An instruction urges planners to place within buildings 'only those chemical industry installations the operation, maintenance and life-span of which makes it absolutely necessary'. It lists as suitable for open-air siting: 'Various ovens, cooling machines, vulcanizing boilers for the rubber industry, autoclaves, fermenters, heat exchangers, grinders and mills'. A spokesman for the chemical industry said that 42% of present investments were taken up by building costs. If certain machinery could be placed outdoors, cost of buildings would be reduced to 33% of the investment programme.

●**United States** — The Goodyear Tire and Rubber Co. and the Firestone Tire and Rubber Co. will open new contract talks with the AFL-CIO United Rubber Workers' Union on March 20.

●**India** — The new plant which Union Carbide India Ltd. has set up at Trombay is now ready to go into production. Manubhai Shah, Union Minister of Industry, will perform the opening ceremony today (March 11). The plant has been completed at a capital cost of Rs.4.5 crores (£3.4m.) and will produce annually 15m. lb. of chemicals and polythene resins and compounds, valued at about Rs.2.5 crores (£1.9m.).

●**East Germany** — Negotiations between the Federation of British Industries and the Chamber of Foreign Trade of the German Democratic Republic on the bilateral trade arrangement for 1961 have resulted in a £4m. increase over last year's agreed total volume. The UK's export quota for chemicals is £400,000, and for machinery £200,000. New items on the UK import list include tyres and tubes for racing cycles.

'OK Mister Wise Guy Goodyear — so you've cooked rubber in sulphur — so it'll maybe taste better—so what?'
— 527

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A BRITISH RAILWAYS railway that runs all over the British Isles. And beyond that is Southampton Water, a transit point for the whole world. At the top of the garden is the Marchwood by-pass, a fast new road into Southampton and all points north, south, east and west. DELIVERY—that's what we are getting at. Fast, punctual delivery of INTOL to anywhere in Britain, to anywhere else in the world as fast as a ship can get there. We shift rubber fast but stocks of all grades are always maintained to meet demands.

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More I.C.I. Activity

ALKYLAMINE CAPACITY TO BE STEPPED UP

IMPERIAL Chemical Industries, which announced last week that it was to invest £100m. in the Common Market, has released further expansion plans this week. The company is to increase its alkylamine capacity, and to construct new laboratories for its General Chemical Division.

At present the Heavy Organic Chemicals Division has two plants for making mono-, di-, and tri-methylamines, and one plant for mono-, di-, and tri-ethylamines, with a combined capacity of between 2,000 and 3,000 tons per year.

A completely new methylamines plant is to be built with a capacity more than five times that of the existing unit, which began production in 1952 and which will now be superseded. I.C.I. says that the new plant, which is due for completion in 1963, will be one of the largest in the world and will use the most advanced manufacturing techniques. It should enable the company to satisfy the rapidly expanding UK market and to increase methylamines exports to most parts of the world.

The capacity of the ethylamines plant is also to be lifted to well over double the present figure. These extensions should be completed by the end of 1961.

The company comments that, as with the methylamines, the larger capacity has become necessary to make sure that the company can meet the growing UK ethylamines requirements, and continue to compete effectively in export markets.

I.C.I. is the only UK manufacturer of methylamines and ethylamines, which are intermediates for a wide range of end-products including rubber chemicals.

Laboratories at Runcorn Heath

The new laboratories for the General Chemicals Division will be built at Runcorn Heath. The Division has expanded rapidly in recent years, particularly in the fields of chlorinated solvents, monomers for synthetic fibres and plastics, and organic fluorine products such as the 'Arctons' and 'Fluothane'. I.C.I. says that the original buildings of the early research establishment have now been progressively extended to the limits of the capacity of the site.

The additional laboratory accommodation at Runcorn Heath will be on a site adjoining the Division's engineering and technical department offices and the future headquarters of the Division which is being moved from Cunard Building, Liverpool. Small scale laboratory research will be carried out at Runcorn.

The main laboratories at Widnes, together with the nearby recently completed multi-purpose pilot plant facilities, will be retained and developed as the centre for larger scale research and pilot plant production. The labour required in Widnes for these activities has been expanded recently and will remain unaffected by these changes.

It is expected that the new laboratories will employ about 500. They will form part of the general expansion scheme at Runcorn Heath which may eventually cost up to £2m.

Polyester Film Plant On Stream

THE new I.C.I. plant for manufacturing Melinex polyester film was officially opened at Dumfries, Scotland, last week.

The plant, which has an annual production capacity of 2,000 tons or more, is at present providing employment for 156 payroll workers and staff, of whom more than 130 are local people. By the end of the year there will be 210 people engaged on the plant — 170 payroll and 40 staff.

General view of the I.C.I. polyester film plant at Dumfries, which is expected to meet all UK requirements for this film

The decision to site the plant at Dumfries was announced by I.C.I. Plastics Division in June 1959. The company says that one of the reasons for selecting Dumfries is that the site is suitable for further development. The plant is housed in a factory, which, until three years ago, was used for the manufacture of 'Ardil' protein fibre.

Applications for Polyester Film

I.C.I. is the only UK manufacturer of polyester film, where high dielectric strength and availability in very thin gauges makes it an attractive material for the electrical industry for small condensers, capacitors and electric motor slot insulators. In cables it can be used both as a barrier against water or plasticizers and as a strong, thin dielectric lapping material.

Due to its low gas permeability, flexibility at low temperatures and good chemical resistance, polyester film has been used for lining hoses and for conveying gases, liquefied gas and corrosive chemicals. Remarkable dimensional stability is claimed for it, and this should lead to useful applications in engineering and drawing offices as a replacement for conventional plastic films where accuracy in plan drawing and plan reproduction is required.

No Plasticizers

As Melinex contains no plasticizers it can be metallized by the vacuum process, and the film metallized with aluminium is said to be finding wide use in the decorative field in the form of tinsel. Non-tarnishing textile effect threads and laminated panelling materials are also made from the metallized film.

I.C.I. comments that the film has not yet found 'any really extensive uses in packaging', but adds that when ample supplies are available 'there is a great potential here for a film with such crystal clarity and sparkle'.

I.C.I. has been making polyester film in small quantities on a pilot plant at Welwyn Garden City, Hertfordshire, since 1954. Although subsequently enlarged, the output of this pilot plant has permitted of little more than market evaluation. The new plant at Dumfries will satisfy all immediate UK requirements.

1960 Plastics Sales 12% Up

BUILD UP OF STOCKS THROUGHOUT THE YEAR

IN spite of the drop in plastics materials sales in the latter part of 1960, total sales for the year were 12% higher than in 1959.

Official figures published by the Board of Trade show that sales were 561,700 tons, compared with 500,800 tons in 1959. The level of sales in the first quarter of 1960 was a record at 147,000 tons — 30% higher than a year earlier; sales in the second and fourth quarters sank below this record level (the third quarter reflecting the usual seasonal drop). The fourth quarter sales were less than 2% higher than a year earlier.

Production Outstrips Sales

Production throughout 1960 expanded at a greater rate than sales. Over the year as a whole production was 19% higher than in 1959; in the last quarter it was 8% higher. Stocks built up throughout the year, and at the end were 102,900 tons (41,200 tons or some two-thirds higher than at the end of 1959), of which 81,900 tons were thermoplastic stocks (37,500 tons higher than at the end of 1959).

Sales of thermosetting materials in 1960 were some 9% higher than in 1959, but in the fourth quarter of the year they slipped to a level 4% below the corresponding 1959 period. Thermoplastic sales were 14% higher over the year, and 5% higher in the fourth quarter.

Direct exports of plastics materials in 1960 at 162,500 tons were almost 11% or 16,000 tons higher than in 1959, as compared with an increase of nearly 28% between 1958 and 1959. Imports during the year were at the very high level of 93,300 tons — 38,800 tons more than in 1959.

Estimated UK consumption of plastics materials (UK manufacturers' sales less exports plus imports) was about 20% higher in 1960 over 1959.

The detailed figures in the table below have been compiled by the Board of Trade from returns of nearly 170 manufacturers of plastics materials.

1960 NET SALES OF PLASTICS MATERIALS
(in thousand tons)

	1960	1959 (*revised*)
Thermosetting materials:		
Alkyds	49.9	49.7
Aminoplastics ..	59.9	54.6
Phenolics and cresylics	78.3	73.3
Unsaturated polyesters (a)	8.4	6.7
Others (b)	14.2	8.9
Total thermosetting ..	210.7	193.2
Thermoplastic materials:		
Cellulose plastics ..	13.5	11.7
Polyvinyl chloride (c)	103.3	88.3
Polystyrene	42.8	39.3
Polyvinyl acetate ..	14.6	13.2
Polyolefins (polythene and polypropylene)	106.7	155.0
Other (d)	70.1	
Total thermoplastic ..	351.0	307.5
Total, all plastics materials	561.7	500.8
Stocks at end of period:		
Thermosetting materials	21.0	17.3
Thermoplastic materials	81.9	44.4

Note: Any apparent discrepancies are due to rounding of figures.

(a) Excluding epoxide resins and resins for the manufacture of polyurethanes.
(b) Including epoxide resins and casein plastics.
(c) Excluding sales of resins (*i.e.* polymers sold as such).
(d) Including acrylics, polyamides, polytetrafluorethylene, polyvinyl chloride resins (*i.e.* polymers sold as such).

THOMAS MARTIN

WE announce with regret the death of Thomas Martin, FIRI, chairman of the Anchor Chemical Co. Ltd. A spokesman for the company said that he died peacefully at his home on Tuesday March 7. He was 69.

Mr Martin joined Anchor in 1914 and was a director of the company for 38 years, and had been chairman since 1956. His life was spent in serving the interests of the rubber and allied industries in many ways.

Services to the IRI

He served on local and main committees of the Institution of the Rubber Industry, and was made a fellow of the Institution and a vice-president. He was a member of the council of the Rubber and Plastics Research Association, and chairman of the Factice Research and Development Association.

With his death the rubber industry loses one of its best-known and most notable figures. An appreciation will appear in next week's issue.

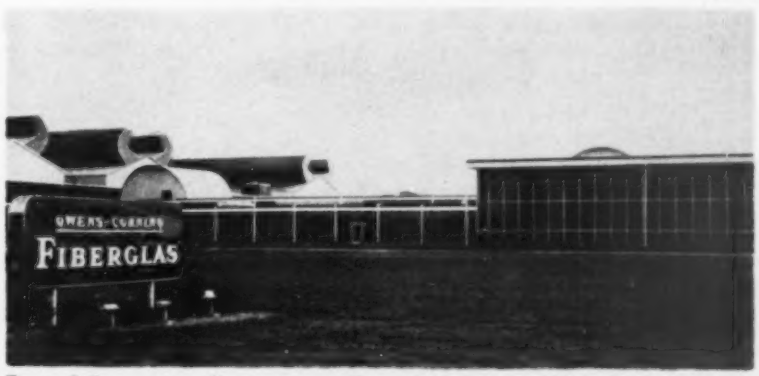
Owens-Corning Fibre Plant

NEW MULTI-MILLION DOLLAR PROJECT

A NEW 900,000 sq. ft. textile yarns manufacturing plant, which when completed will be the largest and most modern synthetic fibre plant in the United States, has been put into initial operation in Aiken, South Carolina, by Owens-Corning Fiberglas Corporation. This is part of the OCF 1960 improvements programme, total cost of which is $44m., and will have an annual production capacity of 70m. lb. of high quality glass fibres.

Special equipment automatically feeds, weighs and blends the raw materials and conveys them to furnaces under rigidly controlled conditions, which will result in greatly improved efficiency and product quality, according to Harold Boeschenstein, Fiberglas president.

Processing equipment includes newly designed gas-fired furnaces to melt and refine the glass, new fibre forming and winding equipment, new twist and ply machinery which produces larger, more uniform textile fibre packages, electronic equipment to check finished yarns, an electronic production recording system, and an extensive overhead electrical monorail system to insure rapid and clean operating conditions.



Part of the new textile yarn manufacturing plant at Aiken, South Carolina recently opened by Owens-Corning Fiberglas Corporation

Accelerators and Antioxidants for Rubber

PART II: MANUFACTURE AND DISTRIBUTION

By L. M. DADSON, MA,
I.C.I. Dyestuffs Division

IN considering non-dusting physical forms, there tends to be a basic difference between accelerators and antioxidants, which reflects on the way in which they should be used. Accelerators tend to be formed as powders, and these may be pelletized by the incorporation of a small amount of a suitable binder. Antioxidants, however, tend to be formed as relatively low melting resinous bodies. These cannot be pelletized like the accelerators, but they can be formed, while molten, for instance, by extrusion. The resultant shapes are homogeneous and contain no binder. Thus when non-dusting accelerators are used they are easily broken down into the component powder particles, and good dispersion is obtained irrespective of mixing temperature. Non-dusting antioxidants, however, may have to be melted to give good dispersion and could be difficult to use in very soft stocks at low mixing temperatures. Fortunately the melting points of these antioxidants are low enough for normal mixing procedures generally to be suitable.

Quality Control

Manufacture is not completed, of course, with the production of the chemical. There still remains the control of the product, the specification testing which ensures that a standard quality is made. The very first step is to ensure that the right chemical is made, so that it is wise for a manufacturing specification to open with the statement that the product shall be made by the standard manufacturing process. This may sound obvious, but it means that standard raw materials are used in a standard way, and should yield a standard product. Often a good check on the result is the melting point.

In setting up the specification for a rubber chemical, it is necessary to consider what impurities may be present and to test for those which may be harmful. For instance, there may be inorganic impurities, perhaps from residual catalyst, or picked up from the plant. These may be controlled by measuring the ash content. It could be that a residue of unreacted intermediate might affect the technological properties of the product, and must therefore be controlled. Examples are free amine in sulphenamide accelerators, and unreacted MBT in dibenzthiazyl disulphide. In each case an undue amount would give reduced processing safety. Worse, a variable amount from batch to batch would give rise to an accelerator of variable performance.

Another possible impurity is water. Many products are made by essentially an aqueous process and a check must be made on the drying stage. Thus the specification will contain some kind of moisture clause, often weight loss at 100°C., if the melting point concerned will allow that temperature to be used. One other possible impurity which must be controlled very carefully in rubber chemicals is copper, the presence of which can cause such rapid degradation of rubber. In the case of powder products, fineness is an important consideration, and naturally there must be no obvious contamination with iron scale or fibrous matter or the like.

A manufacturing specification is not something which can be set up overnight, nor can it be set up in advance. It must relate the technological performance required of that product to the feasible limits of the manufacturing process. It must set a target which at one and the same time is a strict enough one to ensure a good and reliable product and yet is one which the plant can be expected to attain in routine manufacture. Obviously it must be the outcome of the pooled experience with a particular product of both manufacturing and technical service departments, with the latter acting as the agent of the user in this case. A typical accelerator specification is that for dibenzthiazyl disulphide, Vulcafor MBTS.

'The material is made by the works manufacturing process for Vulcafor MBTS, and is a creamy white, fine powder free from particles of grit, iron scale, fibrous matter, or similar impurities.

Fineness, by Gallie Porritt:	0.05% max. retained by 100-mesh BS sieve
Melting point:	Completion 170.0°C. min. Range of melting, 4.0°C. max.
Sulphated ash:	0.6% max.
Loss at 100°C.:	0.5% max.
Mercaptobenzthiazole content:	1.5% max.
Copper (Cu):	20 parts per million max.'

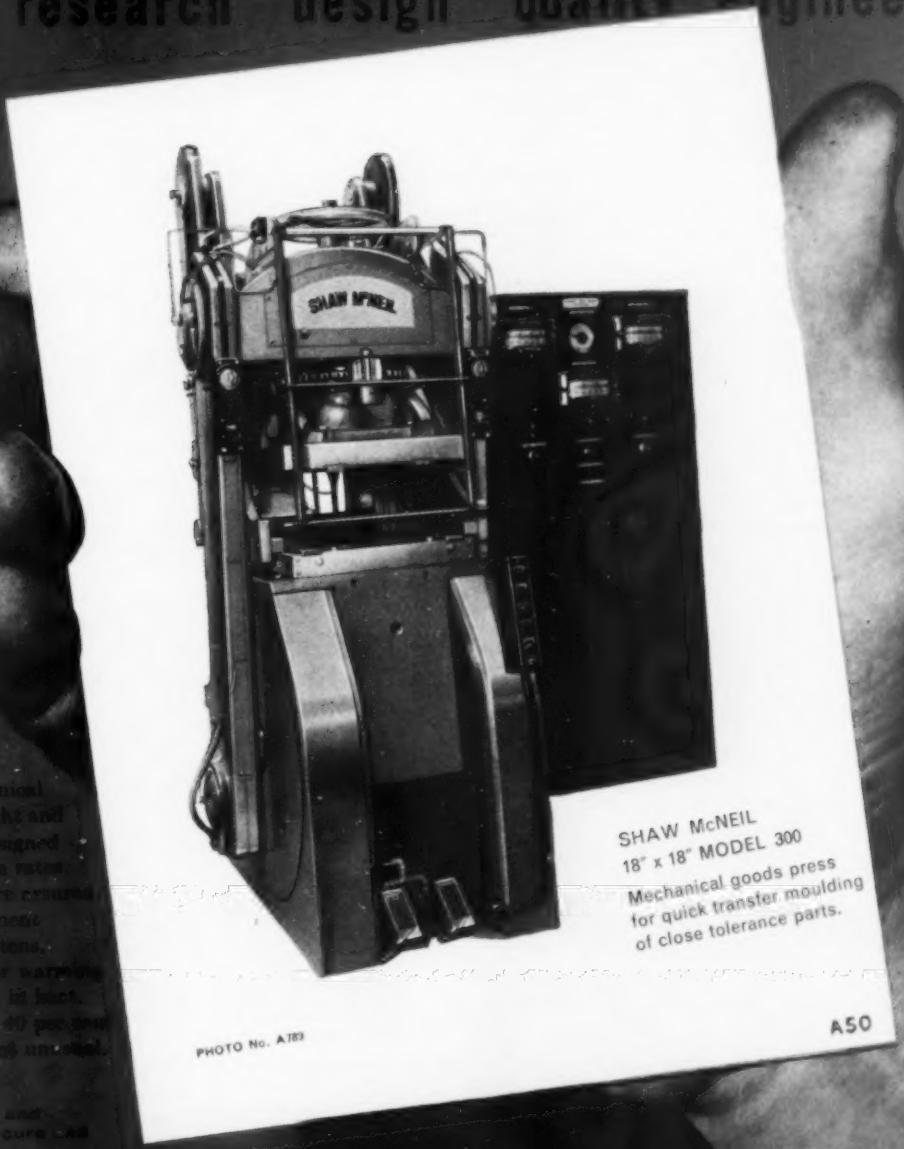
The permitted amounts of impurity are low, the melting point range is

Fig. 3. The unassembled components from which the Manjute rigid pallet is constructed

behind every

Francis Shaw machine

research design quality engineering



SHAW McNEIL
18" x 18" MODEL 300
Mechanical goods press for quick transfer moulding of close tolerance parts.

PHOTO No. A783

A50

Shaw McNeil mechanical goods presses for light and heavy duty are designed for higher production rates. Fast curing cycles are ensured by moulds in permanent contact with the platens, avoiding the need for warming up, and economising in heat. Savings in excess of 40 per cent in curing time are not unusual.

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OVERSEAS AGENTS THROUGHOUT THE WORLD

narrow and the fineness clause is a stringent one. This specification illustrates well the striving after as high a quality as possible, while keeping a realistic view of plant capabilities.

Now the raw materials have been converted into rubber chemicals, which have been carefully tested for quality. These chemicals, however, are useless both to their manufacturer and to their consumer while they are simply stacked in the warehouse. The important stage of distribution is very commonly by road transport, and one interesting aspect of this is the development of bulk handling to which a lot of attention has been given in recent years. The principal cause of the development is the growing desire for mechanization, and the principal instrument of mechanization in this case is the fork-lift truck. Provided the load on a lorry is properly packed, and properly presented to the lift truck, the lorry can be unloaded with astonishing speed. The user likes this, because of the saving in time and labour, and the supplier likes it because of the faster turn-round in transport. The basis of the operation is a pallet — a unit on which a load can be stacked conveniently, and into which the forks of the truck can be inserted easily for lifting. Consequently the design of the pallet is a big consideration and one development programme is described below.

Fig. 4. A lorry carrying a palletized consignment of 24 unit loads

Palletization

The average lorry is 7ft. 6in. wide, although it can be wider — up to 8ft. Conveniently, pallets should be loaded two-by-two so that the lorry can be attacked from both sides. The fork-lift truck has to operate in warehouse gangways, where space is valuable, so that its load cannot be too wide, and the load length is at least partly dependent on the fork type and length. Considerations of this kind, coupled with some attention to the best way of sack packing, caused a pallet size of 48in. square to be adopted at first. Initially the pallet was of wood — virtually a flat box. This proved cumbersome and expensive, and so the pallet evolved, via rectangular metal sleeves in stout paper or hessian slings, into the present form, which is marketed under the name 'Manjute' Rigid Pallet.[9] This is made up from three component types:

1. Two welded steel-mesh sleeves, normally made from 3 x 3in. mesh with nominal dimensions at the entry points of 6in. width and 3½in. depth.

2. Two fibreboard covers for the welded mesh sleeves. These are made from strong double-faced corrugated board.

3. Two or more wooden deck-pieces, normally made from 3 x 1in. planed softwood, each fitted with two sets of blocks screwed to the underside of the board for placing over the sleeve units.

These components are illustrated unassembled in Fig. 3.

These components can be stored simply and compactly, with the mesh sleeves already inside the covers. To assemble the pallet, the deck-pieces are placed in parallel across the covered sleeves, which are at right-angles to the deck-pieces. The assembled pallet is, in fact, smaller than the original plan, being 45in. square in size. The reduction from 48in. means that the sacks overhang the pallet a little, and there is no risk of a pallet tearing a sack if two loads come into contact. The loading on the pallet is the next important point.

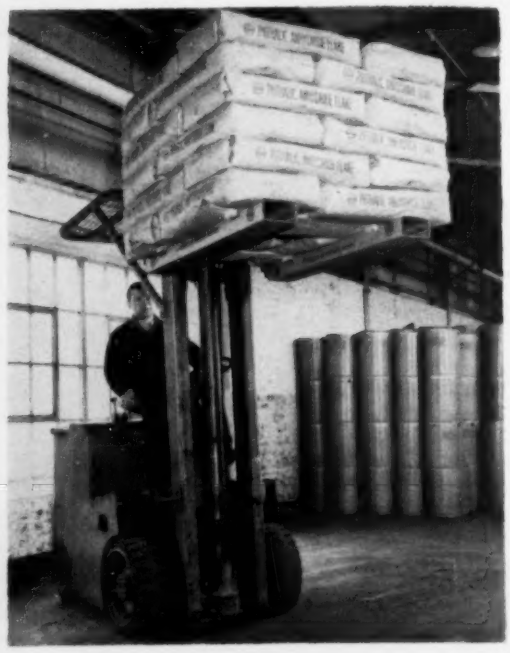
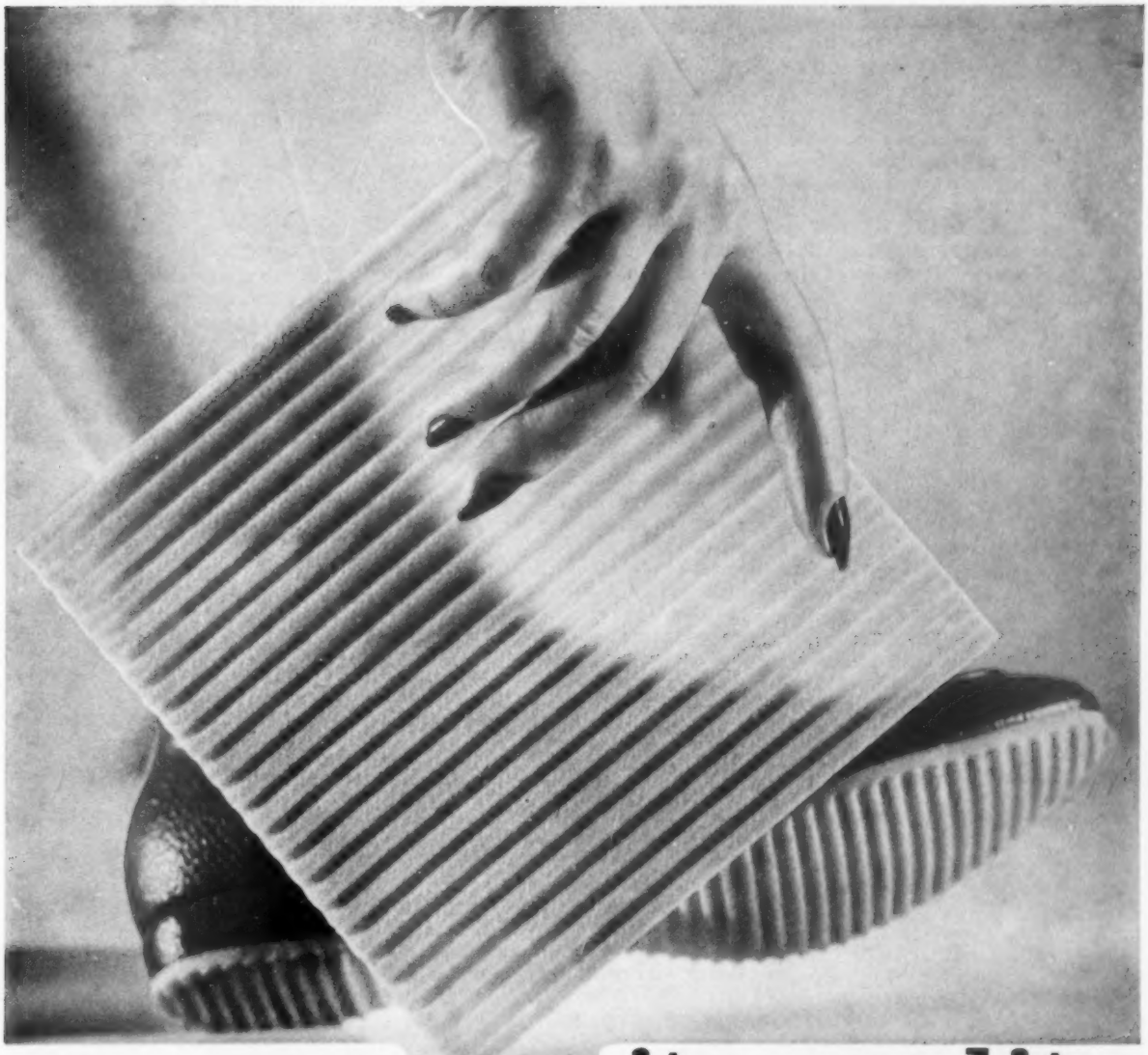


Fig. 5. Typical load on the Manjute pallet, built using the nose-to-tail formation

Paper Sacks

Most rubber chemicals are in a dry physical form, often as powders or pellets. Consequently paper sacks, which are the most attractive packs economically, are satisfactory for the majority of products. In the case of paste forms, such as accelerator pastes for latex, a polythene liner is enough to make paper sacks serviceable. Only



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Manufacturers of crepe soling stock based on Polysar Krylene NS have found that this rubber possesses these three qualities in the highest degree. It makes possible the production of a lightweight, crepe-like vulcanizate of consistently high quality.

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D

exceptionally, as for a liquid or in small-scale deliveries, need drums, metal or fibreboard be considered. The principal problem is to find the best size of sack, and the best method of stacking.

By trial and error it was found that a stable load could be obtained using sacks which, when filled, measured 20in. x 5in. x 28in. These are stacked in a 'nose-to-tail' formation, with the layers alternating in direction. This method achieves a chimney type structure with an 8in. square cavity appearing as the chimney size. Normally five or six layers of sacks are used on each pallet, giving a unit load of 20 or 24 sacks. This is largely a question of height, and is to meet British Road Services requirements when a lorry is stacked two loads high.

The most important layer, of course, is the first, which is the foundation of the unit load. The sacks in this layer should preferably be arranged so that they are supported down their length, by placing them centrally over either a deck-piece or a sleeve unit. Using the chimney formation, only two deck-pieces are needed for each pallet. The sacks of the first layer lying parallel with the sleeve units are supported centrally down their length by the sleeve units themselves, and the packs lying at right angles to the sleeve units are supported centrally down their length by the deck-pieces. The rest of the load is then built up on this foundation, achieving the result shown in Fig. 5.

Loading

An average 15-ton lorry will take 24 of these palletized unit loads, 12 of them being laid on the deck of the lorry in two rows of six, and 12 of them being laid on top. A point about the deck is that it should be flat: if the sleeve units of a loaded pallet rest on an uneven surface, distortion may take place. Consequently the sleeve units should not be allowed to rest over the chock-rails of the lorry. Baseboards are used as deck lining to present a uniform level to the pallet. The pallets are loaded on to a lorry that has a baseboard lining, and one man with a fork lift truck can load a lorry in approximately half-an-hour. To load the same quantity of loose sacks, two men would need about two hours, and would need to work very hard. A lorry carrying a palletized consignment of 24 unit loads is shown in Fig. 4.

Incidentally, the amount of product which is put into a sack can vary quite widely between products. This, of course, depends on packing density; the amount used is that which fills the sack to approximately the right dimensions. The word approximately is used deliberately because it is desirable always to use a standard weight for a given product and because that standard weight must be a reasonable one in two systems of measurement — pounds and kilograms. In fact the most common sack-load is 55lb. or 25kg., but one range for rubber chemicals is from 33lb. to 66lb., or from 15kg. to 30kg.

Tea Cosy Pack

Export trade was responsible for a second palleting development, the so-called 'Tea Cosy' pack. Consideration here includes the need for the sacks to be kept together during several loadings and unloadings, the need for facile handling by lift truck and by slings, and the need for some protection against bad weather. The design which evolved is based on a wooden pallet, which has the ends of each runner cut away to facilitate handling by slings. The sacks, arranged 'nose-to-tail' in the familiar chimney structure, are over-packed by a large cover, made of scrim-reinforced bitumen-bonded crepe paper. This cover, when opened out before being placed over the load, resembles a tea-cosy.

The load is strapped to the pallet with tensional steel strapping used twice in two directions at right-angles. A simple wooden frame is placed over the cover and under the strapping, to give something into which the strapping can bite, to prevent damage to the load by pressure from slings, and to help square off the load. Finally, the cover carries the instructions 'Forks Here' as a guidance to truck drivers.

One early difficulty was a tendency for the strapping to slacken off due to the settling of the product in the sacks, and this led to reduced stability of the load. A suitable table was developed which carried another unit load and which was then placed on top of the 'Tea Cosy' so that the strapping could be applied while the 'Cosy' is compressed.

Thus pallets have been devised both for home and overseas traffic. Using these quite ingenious aids, accelerators and antioxidants, which were taken from the ground as coal and petroleum, were manufactured and were rigidly controlled, are delivered with the minimum of fuss to the consumer's warehouse.

Acknowledgements

The author wishes to express his gratitude to the many colleagues in the Dyestuffs Division of I.C.I. who provided information towards this paper.

REFERENCE

[1]Anon., *Mechanical Handling*, 1959, **46**, 6.

Car Industry Talks

The Minister of Labour, John Hare, presided over the second joint meeting of leaders of the motor industry and the Confederation of Shipbuilding and Engineering Unions, which was held at the Ministry of Labour last week.

The employers' representatives to the meeting, which reviewed industrial relations in the industry, included Sir Edward Beharrell, the chairman of Dunlop Rubber Co. Ltd.

PVC Symposium at the National College

A symposium will be held on recent developments in pvc compounding and processing at the National College of Rubber Technology on March 21 and 22 1961. Seven papers will be presented, each being followed by a discussion period.

Recent developments in compounding ingredients, methods of compounding, and processing techniques will be discussed and the college hopes that the symposium will provide a unique opportunity for pvc processers to discuss pertinent aspects of pvc technology.

Papers

Papers to be given are: 'Factors affecting the properties of vinyl chloride polymers and copolymers' (C. A. Brighton, British Geon Ltd.); 'Some thoughts on pvc plasticization' (T. C. Moorshead, A. Boake Roberts and Co. Ltd.); 'Stabilization of pvc compounds' (J. A. Rhys, F. W. Berk and Co. Ltd.); 'PVC-rubber blends' (J. E. Bramfitt and J. M. Heaps, BX Plastics Ltd.); 'Compounding techniques' (G. A. R. Matthews, I.C.I. Plastics Division); 'Trends in pvc extrusion' (A. Kennaway, BTR Industries Ltd.); and 'PVC sintering processes' (W. Adams, Vinatex Ltd.).

Lumenated Showrooms

A new area sales office and showroom has been opened by Lumenated Ceilings Ltd. at 10 Jesmond Street, Newcastle-upon-Tyne 2 (Telephone: 814301).

BIP Cuts Price

BIP Chemicals Ltd. has made reductions in the prices of its Beetle polyester resins.

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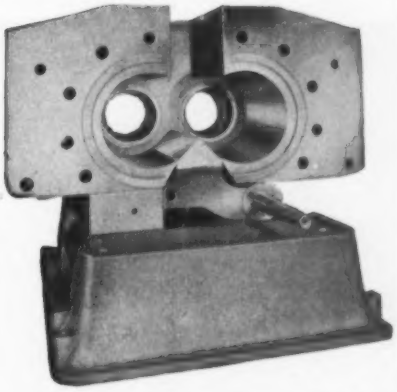
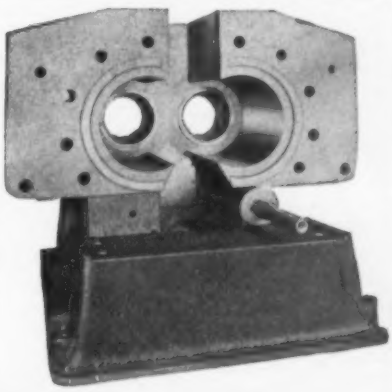
Here's a new development in Banbury mixer design: the hydraulically-operated drop-door . . . now available as an optional feature on all new production-size machines. The drop-door design does away with a source of leakage and contamination which cannot be avoided in sliding-door design. Clearances which permit some leakage are required for sliding action which is not the case with the drop-door. The new door is hinged, and the surfaces of the door edge and the bottom of the mixing chamber are tapered so that a good line of contact is obtained. The door is leakproof throughout a full period of normal wear and there are no tailings left to contaminate a succeeding batch. The new door has been clocked as low as eight seconds for opening, discharge and closing—more than twice as fast as a sliding door. As a result, the overall mixing cycle is reduced. And, in short-cycle operation, discharge time is in better balance with actual mixing time.

Faster discharge, besides cutting cycle time, is particularly advantageous when formulas require almost instantaneous discharge after pre-determined temperature is reached. With some, a few seconds lag will permit the stock to set up in the mixing chamber.

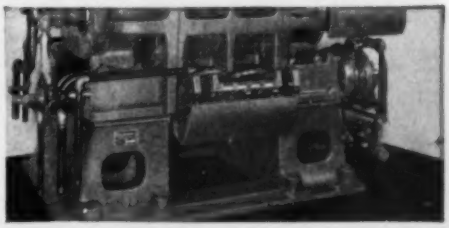
* ***Banbury is a registered trade mark in many countries throughout the world***



Chamber of Banbury with drop door in closed position



Drop door partially open



Angular view of drop door in open position

Size 11 D-High Pressure high horsepower uni-drive Banbury Mixer with drop type discharge door.

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IRI/PI Conference

Rubber and Plastics in Cables

PROPERTIES OF CARBON BLACK RESPONSIBLE FOR ANTIOXIDANT ACTION

A ONE-DAY conference on rubber and plastics in cables, arranged jointly by the Institution of the Rubber Industry and the Plastics Institute, took place on March 1 at the Institution of Electrical Engineers, Savoy Place, London (*RPW*, Dec. 24, 1067, and Jan. 7, 8).

This was the second joint conference to take place, after a lapse of just over three years. In November 1957 a similar function on natural and synthetic polymers in conveyor belting was reported in *RPW* (Nov. 30, 868) as being well attended. This second joint effort was also very well supported and exceeded the expectations of the organizers by quite a large margin as over 350 people attended. It is to be hoped that this will encourage the two institutes to get together more frequently in the future as this is probably one of the best ways in which closer liaison between the two industries can be achieved.

Antioxidants

The subject matter of all the lectures was both interesting and important, but the highlight of the day was the talk given by Dr W. L. Hawkins of Bell Telephone Laboratories Inc., who had travelled from America to present his paper on the stabilization of plastic insulating materials.

By his replies to questions, Dr Hawkins showed his clear grasp of the subject. His presentation was excellent and he must have given many of the delegates food for thought. That not all of them agreed with his theories was evident from the comments arising during the discussion, but his explanations of the phenomenons described were at least as probable as any counter theories propounded.

The role played by carbon black in the reinforcement and protection of rubber and plastics is by no means fully understood; work is being done in many research departments throughout the world and the literature on the subject is increasing from day to day.

Dr Hawkins confined himself to a description of work done to establish the properties of carbon black responsible for its antioxidant action. These inhibiting properties were, he said, attributed to the presence of hydroxyl, ketonic and quinoid groups on the surface of the particles which, on reaction with oxidizable polymer groups, formed stable groups preventing further reaction.

Sulphur containing groups had the same effect, and this had been confirmed firstly by increasing the number of oxygen or sulphur containing groups on the carbon black, and secondly by activating the surface of silicone particles with similar groups. In both cases the antioxidant effect of the filler was increased.

Synergistic Combination

He indicated that further work had shown that combinations of carbon black and a variety of sulphur compounds formed antioxidants which inhibited polymer oxidation to a much greater extent than had been anticipated from the contribution of the individual components. In particular, the thio-bis-phenols had been found to be useful in this respect. Formation of these antioxidant combinations was apparently independent of the surface reactivity of the carbon black particles, since carbons essentially free from reactive groups also formed synergistic combinations.

Organic compounds which functioned in a similar way to carbon black in combination with these sulphur compounds had been developed, Dr Hawkins went on. These were related to carbon black structurally, being polynuclear aromatic hydrocarbons, and suggested the mechanism through which the synergistic antioxidant combinations functioned.

Dr Hawkins concluded on a humorous note by saying that the functions of carbon black were as numerous as those of that character of W. S. Gilbert who said: 'Oh, I am a cook and a captain bold, and the mate of the *Nancy* brig, and a bo'sun tight and a midshipmite, and the crew of the captain's gig'.

Down to Earth

Another very interesting paper was the one read by Sir Christopher Hinton, chairman of the Central Electricity Generating Board on the problems of power transmission.

The thought uppermost in the minds of many people on this subject is that of the objection to overhead cables for aesthetic reasons. Sir Christopher was not able to do much to dispel the fears that the countryside would become increasingly festooned with wires, as the cost of putting high voltage lines underground was almost 20 times as great as the cost of overhead lines. However, he said, the British public might not tolerate an indefinite extension of the present transmission and distribution network, and the solution was underground cables at tolerable cost.

Reducing Cable Costs

He urged the cable industry to direct their efforts to solving this problem and said that it should be possible to produce extruded cables tough enough to do away with the lead sheath and armouring used at present — thus reducing the cost of the cable. Other aims should be the reduction of jointing costs and the production of more flexible, easily handled cables, which could be laid using mechanical plant to bring laying costs into a more acceptable price range.

As an example of the relative costs of over and underground cables, Sir Christopher stated that to erect two 275kV. lines would cost approximately £23,000 per mile while the underground equivalent would cost £400,000, of which £250,000 was the cost of cable and £150,000 laying costs. The possibility, therefore, of putting high voltage lines underground was remote although some consideration was being given to avoiding 'birds nesting' in the area of switching stations by laying the last half mile underground.

Low Voltage Cables

The position with regard to low voltage cables of 11, 33 or 66kV. was very different, he continued. The use of underground cables (already general in urban districts) was being seriously considered by several of the area boards and a reduction in cost would aid this trend.

The cost difference for cables of this capacity was not so great, an 11kV. overhead line costing £1,200 per mile and an underground cable £8,300, of which £5,300 was the laying cost. Insulated cables were also

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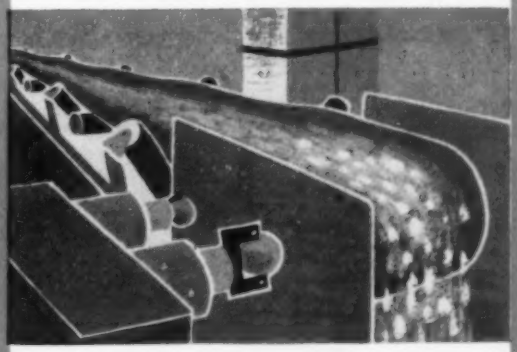
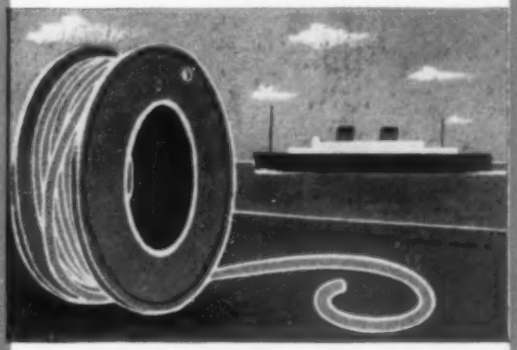


BUTYL FOR HEAVY INDUSTRY
This Butyl-covered conveyor belt at I.C.I., Billingham, has outlasted four ordinary belts and is still going strong.



BUTYL FOR ELECTRICAL INSULATION
Supertankers and liners have been wired throughout with Butyl-covered cable—lighter, smaller, (therefore less costly), with greater resistance to heat, ozone, moisture.

BUTYL FOR BUILDING
The building industry uses foam Butyl as a joint seal for gutters. It makes the perfect seal: easy to install, flexible, and absolutely waterproof.

IN CHEMICALS

being used to advantage, he added, where it had been found possible to conceal the lines in woods without the need for extensive lopping of the trees as would have been essential if the older type of bare conductor had been used.

Cable Requirements

In his paper on the electrical properties of insulating materials in power cables, N. Parkman, of the Electrical Research Association Laboratory, described the requirements in cable dielectrics. One of the most important properties needed, he said, was a low loss factor, as, if too much heat was generated in the cable, thermal instability might be caused, the cable continuing to rise in temperature with disastrous results. Although the intrinsic strength of a dielectric such as polythene was of the order of 6mV./cm., the actual working voltage of cables was only about one-twentieth of this — partly because of the need for a safety factor to allow for overload conditions, and partly because manufacturing techniques could not guarantee the absence of voids and other faults which could cause local discharge and breakdown.

Mr Parkman suggested that low loss materials such as polystyrene and polycarbonate were promising, and that improved extrusion techniques resulting in more homogeneous extrusions would also have very beneficial effects on the cable industry.

Telecommunications

Many of the points raised by Sir Christopher Hinton and Mr Parkman were confirmed by the paper written by R. J. Halsey of the Post Office Engineering Department, and read by Mr Franklin. He mentioned that some of the limitations of the available plastics were their lack of stability over long periods of time and at extreme temperatures, and their resistance to water penetration, which was not as high as would be required. Another drawback was that screening from atmospheric disturbances was not good enough and metal screens had to be incorporated. On the credit side, he remarked that plastic cables were light, flexible, clean to handle, and not prone to corrosion.

Loading machine at the coal face, showing the wire-reinforced nitrile rubber hose made from I.C.I. Butakon A by the Electric Hose and Rubber Co. Ltd., which is used to spray water on the coal face during cutting. Sheathing for the power cable to the machine is also made from Butakon A and Corvic vinyl polymer, by the Hackbridge Cable Co. Ltd. A paper on nitrile rubber and vinyl polymer mixtures was delivered at the joint IRI PI conference on rubber and plastics in cables

Cables in Mines

The types of cables in common use for coal cutting machines, portable drilling machines, conveyors and other mining applications, were described by W. C. Symes (National Coal Board). The Board was contemplating an increase in voltage for its cables, from 660 volts to 1,100, he said, and this would entail improved performance from their cables, which had to work in very wet conditions. It was also important that cables should withstand rough treatment. One of the Coal Board tests for impact resistance was described by Mr Symes, in which a 150lb. weight was dropped on to the cable from heights of up to 12ft.

Synopses of other papers delivered at the conference were given in *RPW* January 7, 8.

Bakelite at Leipzig

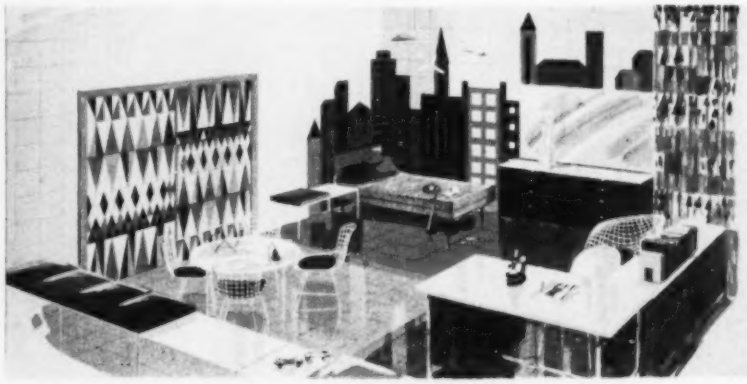
Bakelite Ltd. is taking part for the first time in the 1961 International Leipzig Spring Fair. The company says that this is 'a further stage in the campaign to extend our markets for plastics materials in Eastern Europe'.

A wide range of materials will be displayed. On the thermosetting side, there will be phenolic and alkyd moulding materials, paper and fabric based laminates (including copper clad grades) and polyester and epoxide resins. Thermoplastics on show will include pvc cable and injection moulding compounds and printing materials.

Laminates at Olympia

At the Ideal Home Exhibition, which opened at Olympia on Tuesday, Formica Decorative Laminates are used in outside application along the front elevation of a 'block of flats' erected by New Ideal Homesteads Ltd. of Epsom, in the National Hall. This is the first time that Formica used in external context has been shown at a public exhibition.

The leading Canadian decorative laminate, Arborite, has its own stand at the exhibition for the first time.



At the Ideal Home Exhibition, Humasco features this American nursery to show 'just what can be done with a room in which a child grows up'. Vinyl tiling is used throughout, the chairs are upholstered in pvc and most of the bench and table surfaces are topped with decorative laminates. The exhibition, at Olympia, runs until April 3

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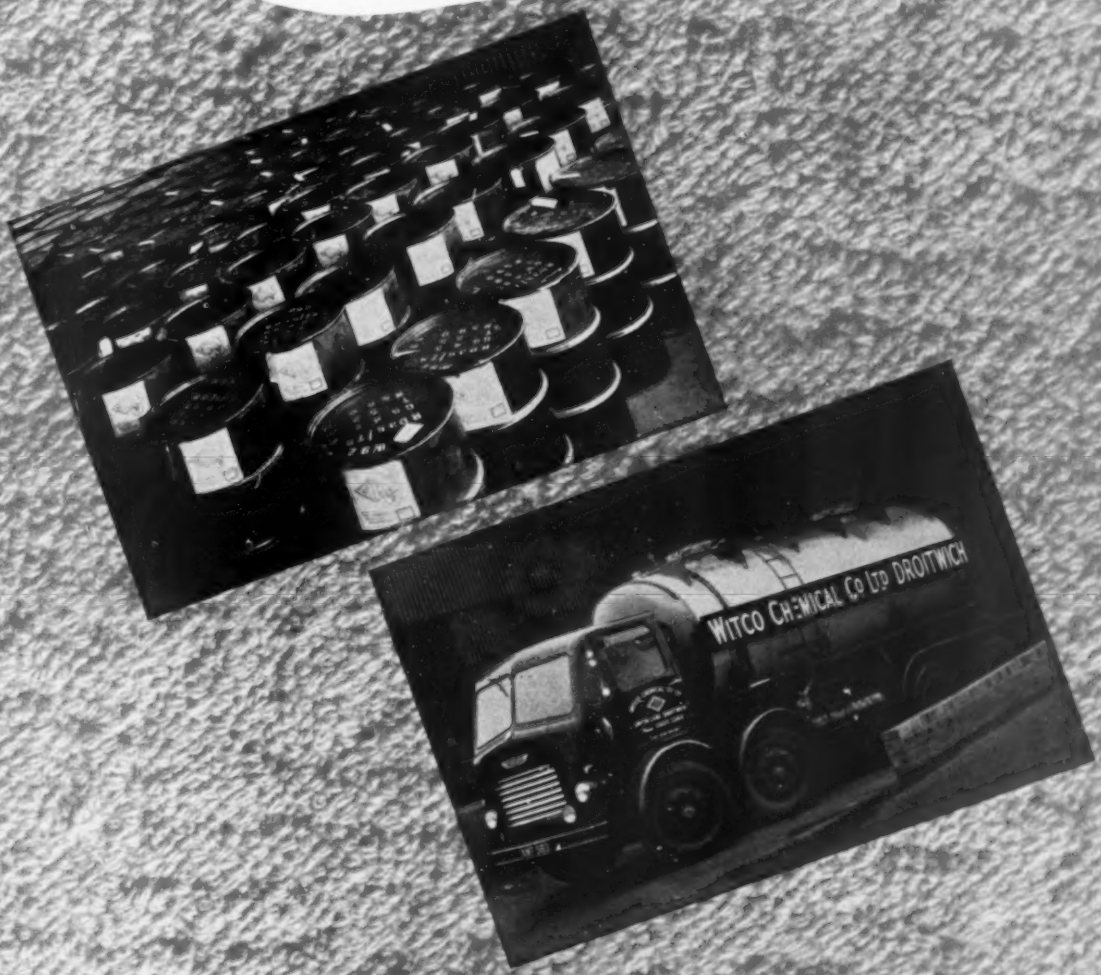


FLOWING TO SERVE ALL THAT IS
BEST IN THE RUBBER INDUSTRY

VIEWS and REVIEWS

I WROTE last week of the advantages for technical readers of a team of expert writers evaluating briefly the significance of a mixed group of lectures or other items of information. I have now come across an example of this in the *Rubber World* for January 1961, Vol. 143, No. 4.

How the Other Man Works

The US achievements in eight specialized sectors of the rubber industry are summarized in the *Rubber World* article.

J. H. Fielding of the Armstrong Rubber Co. deals with tyres, and he describes the arrival of the stereoregular rubbers as 'the most exciting development in rubber chemistry in the past few years'. On other polymers, he says that the production of chlorobutyl 'bridges the gap in adhesion and compatibility between butyl and NR or SBR' and he discusses the greater use of oil-extended SBR.

Other points he makes are that the use of channel black and FEF black is decreasing while the consumption of SAF, ISAF, and GPF is going up. The battle between nylon and rayon in tyres has brought about price reductions and also speculations about the nature of the next new fibre for tyre cord. Automation in tyre manufacture has extended; the fully-automatic, bladder-type press with automatic post-inflation reduces costs and improves quality.

Throughout his survey, Fielding frequently refers to quiet or soft-ride tyres, and uses the word 'siping' to describe the introduction of narrow slots in the tread ribs, which give a quieter ride and also improve traction and reduce wear.

Mechanicals

Mechanicals are dealt with by J. J. Allen of Firestone. He says that non-tyre products use approximately 36% of the total rubber consumed in the USA. Fluoroelastomers have found increased use in hose, diaphragms, and gaskets. (Incidentally, why do the Americans use an 'f' in 'sulphur' but not in 'diaphragm'?) Bulk-storage and transportation tanks made with heavy-gauge nylon fabrics rubberized with oil- and weather-resisting coatings have continued to be developed, and there is increasing demand for rubber items because of booming sales of domestic appliances.

Latex Technology

Howland and Mann of the US Rubber Co. contribute a section on latex technology. In the USA, natural latex consumption is decreasing, they say, mainly because of reduced output of latex foam, which is suffering from the competition of urethane foam, but also because of substitution of SBR latex. (This American trend is also expected to become a world trend.) Because of new SBR latices which have lower non-rubber constituents and therefore process more easily in latex foam, the usage of SBR latex rose from 50% to 65% last year.

Butyl latex has been available for some time, and now dispersions have been prepared of the stereospecific polymers of isoprene and butadiene as well as of the ethylene/propylene rubbers. New latices, based on copolymers of butadiene, styrene, and a third comonomer, which do not require vulcanization, have found applications in carpet backing and other textile uses.

Changes in the Footwear Industry

B. H. Capen of the Tyer Rubber Co., in an article on footwear, says that numerous and radical changes have been made recently in what has always been regarded as a conservative industry. New fabrics have been and are expected to be introduced into the rubber-soled fabric shoe, and, with the new array of colours now available, an increase in production has taken place. Moulded-on soles, plastic footwear, cotton-flocking, are some of the developments that have given better-styled and more attractive footwear.

R. L. Quinlan of Goodyear, discusses soles and heels. Last year the trend towards non-leather soles continued and they now account for 70% of sales. Polyurethane toplifts, with their long wear and low spread, are proving successful on stiletto heels. Heel and sole moulded in one unit from pvc is attached by heat sealing to a pvc welt which has been prestitched to the upper, and these shoes are so successful for children's wear that they are sold at a premium with a guarantee.

In large-scale test is an automatic machine for injection moulding a pvc sole directly on to the upper. Contrary to the trend outside the USA, there is little activity in the direct moulding of rubber soles on to uppers for ordinary dress shoes. Microcellular soling is still running at a high level. In this highly competitive industry, there is a very active research and development programme.

Insulated Wire and Cable

The only anonymous review in this series is on insulated wire and cable, which says that 'the usage of natural rubber in low-voltage wires and cords has been almost completely eliminated. At present, SBR, polythene, or poly(vinyl)chloride is used'. High voltages demand butyl rubber because of its ozone resistance.

In polythene, there are several developments. Special polymers are produced for special purposes. Cross-linked polythene has been developed by the General Electric research laboratory under the name 'Vulkene', and Du Pont have applied Hypalon to the dual-purpose of insulation and sheathing.

'Miniaturization' in electronic equipment has raised new problems. For example, an insulated wire is being produced whose conductor is 'not much more than one-tenth the diameter of a hair'. In another, entirely different kind of processing development, 'Western Electric has been able to combine two tubers in such a way that two different materials can be extruded simultaneously. This process is normally used to produce a wire insulated with polythene and jacketed with pvc'.

J. M. Ball of the Rubber Reclaimers Association writes on reclaimed rubber. The 1960 figure of reclaim consumption is equivalent to about 18% of total new rubber, he says, and this is striking because reclaim is more vulnerable to increases in labour costs than most other products. An important development has been the cooling of the freshly-made reclaim before storing and this has led to the welcome development of supplying reclaim in bales.

COMMENT ON SCIENTIFIC AND INDUSTRIAL MATTERS

by **F. C. JENNINGS**

The Physics of Rubber

The last paper of the series is on the physics of rubber, by S. D. Gehman of Goodyear's Research Division. He deals first with the elastomer requirements of space exploration and then with the development of spectroscopy as a laboratory tool. Infra-red and mass spectroscopy are commonly used in rubber research laboratories, but Gehman draws attention particularly to NMR (nuclear magnetic resonance) and EPR (electron para-magnetic resonance). Both are beginning to yield results of interest to polymer scientists.

'The importance of EPR for rubber research lies in the fact that free radicals, the short-lived, fragmentary intermediates in most vulcanizing, ageing, milling, reinforcing, and polymerization reactions, contain "odd" or "unpaired" electrons which respond to EPR techniques'. EPR may 'mark a new scientific era for rubber technology' by disclosing the mechanism of reactions which at present are largely speculative.

Recently there have been several new approaches to the problems of the behaviour of elastomers under vibratory or transient dynamic forces. One is to stretch a sample at a very high rate and observe the rate of relaxation of the stress; another is the use of 'step-functions'. Finally, Gehman praises the dynamic procedures for following the course of vulcanization, as exemplified in the (German) 'Vulkameter' and the (Shawbury) 'Curometer'.

'The technique appears to have broad uses for determining in an unusually convenient and elegant way curing characteristics such as state of cure, optimum cure time, delayed action, scorch time, and reverting tendencies, as well as having possibilities of being adapted by production laboratories for some factory processing control purposes'.

Accelerator Sequestration

There is a description on pp. 60-63 of the *Rubber World* for January 1961, Vol. 143, No. 4, of the properties and applications of 'molecular sieves', a device which, among many other things, permits fiercer accelerators to be used, and therefore shorter curing times to be achieved, with complete processing safety.

The 'molecular sieve' is a fine powder, the particles of which are 'honeycombed with regularly spaced cavities interlaced by channels of molecular dimensions' and this network of pores, constituting about half the total volume, can take up reactive materials, such as accelerators, and hold them inactive until they are released by heating.

The powder is a kind of dessicated, synthetic zeolite, said to be 'inert and has no effect on the properties of rubber formulations' . . . 'is free-flowing and disperses readily in rubber mixes'.

It can be used also for curing silicones with volatile peroxides, for curing polyacrylates, for speeding-up transfer moulding, and is especially useful where highly accelerated mixes must be stored for a long time, for example, in retreading mixes and in the mixed rubber for moulded shoe soles.

Tyre Studies

The issue of *Revue Generale du Caoutchouc* for November 1960, Vol. 37, No. 11, carries a number of papers of interest to the tyre technologist.

M. Claude Prat of the Institut Français du Caoutchouc discusses, on pp. 1507-11, the testing of the wear resistance of tyres and especially compares the results obtained by loss in weight and loss in depth. He comes to what I call a 'diplomatic' conclusion; that is that they are both good methods and 'you pays your money and you takes your choice'. He says that, properly carried out, both tests yield the same results but he points out that the depth loss method has a number of inherent disadvantages.

For one thing, it takes longer. The tyre must be run longer, say twice as far, to permit measurements of depth loss to be made as accurately as weight loss. The measurement of depths must be done much more carefully and is more complicated than weighing, and it is desirable to take more readings. As a result, the test measurements take four or five times as long, and the calculations from them are longer in about the same ratio.

On pp. 1513-17 is a translation into French of a German article, by M. Fischer of the Czechoslovak Institute of Research, on the Technology of Rubber and Plastics, appearing in *Plaste und Kautschuk*. It is mainly a study of the work of other people, and gives some mathematical precision to various theoretical concepts which are useful in analysing the automation of the tyre building process.

The most important paper in this issue is a long one on pp. 1518-34 on 'International Road Testing of Passenger Tyres Containing HAF and ISAF Blacks' by an international quartet of authors: O. F. K. Bussemaker (Holland), Claude Prat (France), E. M. Dannenberg (USA), and H. Westlinning (Germany). Passenger tyres with natural rubber tread reinforced with either HAF or ISAF black were tested on selected roads and motorroads in various countries including Germany, France, USA and the UK. A carefully worked out plan was followed uniformly and the results are given in detail with the calculations of the wear ratios.

Tests in Texas and Merseyside

'Texas tests gave about the same rate of wear as the European, despite the much higher speed and temperature. The ISAF treads were definitely superior in Germany and England (Merseyside) to Texas, and in France slightly superior, though there the road was comparatively straight with very little severe cornering. ISAF black was found to be markedly superior in severe but intermittent conditions. A difference was clearly demonstrated between groups of road tests and also between different parts of the tyre.'

The report is a good example of how to evaluate a property in service conditions which are sometimes so different as to cause quite a different response from the samples under test. The differences found between roads and driving conditions in different countries were very great. Tyre technologists will be particularly interested in the conclusions reached on testing of tyres whose treads are of a single mix or of two mixes. Both gave the same figures, but, for reasons for which the original must be consulted, and are concerned chiefly with the reliability of statistical evaluation methods, the authors conclude that it is probably better to base road tests on treads each having areas of two or more test mixes, and to use figures of absolute wear.

CHARLES JENNINGS

MEN *and* MATTERS

A Review of People and Events

by Peter Richards

THREE million people spend 6,000 millions hours a year in offices throughout this country. We have heard a great deal about these offices recently — many of them are small, badly-designed and gloomy. With further legislation in draft form and an Offices Act on the Statute Book, we are likely to hear much more in the future about the Ministry of Labour's minimum requirements.

The Institute of Directors, anticipating this, has brought out an excellent book called 'Better Offices', which surveys the present position and suggests what can be done to improve it.

Sales managers whose offices are beyond reproach should nevertheless find this an extremely useful book — the suggestions show that there will be obviously great scope for rubber flooring, laminated plastics and other products in this drive for better offices.

Curtain Up on Phenolic Foam

A little while ago I wrote about museum models, usually made of papier mâché, being formed from polystyrene foam. Now some theatrical designers, who for many years have depended on the traditional plaster and papier mâché, are turning to plastics foams for the creation of their stage sets.

A landscape set is built to rough shape by constructing a light timber framework covered with hessian. The foam is made by mixing a phenolic resin and an accelerator and then poured on to the supporting structure, where it hardens within half-an-hour.

Usually the natural flow of the foam is sufficient for the effect required without any further forming or modelling. Where the sets to be constructed serve to add character to the production, however, the hardened foam can be shaped or finished very easily. To build a cut granite stone wall for the exterior of a building, for instance, the foam can be poured on to the hessian so that it sets in a layer and the courses in the stonework carved with a sharp blade. This takes less time than painting and looks a good deal more effective.

Epoxies on the Map

News of a novel application of a well-established technique has recently reached me. The Clarendon Press at Oxford makes a very wide range of relief maps which must be accurate in contour detail and light in weight. These are printed on thermoplastic-resin sheets and the production of a mould on which the sheets could be formed presented a problem as heating ovens were not available. Shell came to the rescue with a room temperature curing epoxy resin which was used to make a female mould from a relief model built of step-wise layers filled in with modelling clay. The clay model was coated with resin, which when cured formed the basis for a permanent female mould made from a slate loaded Epikote resin, which has proved very satisfactory for the production of the formed sheet.

Rehearsing a children's serial, 'Pathfinders to Mars', at the ABC television studios at Teddington. This 180ft.-long piece of Mars was made at Teddington using a phenolic foam based on a Bakelite phenolic resin *(See: Curtain Up on Phenolic Foam)*

Richardson Becomes Osma Director

That expanding company Osma Plastics Ltd. has announced that R. A. Richardson has been appointed a director. Mr Richardson joined Osma (formerly G. H. Osborn Building Products Ltd.) in 1957. He was instrumental in creating the company's sales policy and the investigation of new plastics applications for the building industry, and has since held the post of sales manager, building division. His new appointment, however, also entails responsibility for the newly-formed industrial division.

Prior to joining Osma, Mr Richardson was for some time a senior quantity surveyor for one of the country's leading building contractors where he gained extensive experience in building technology. Formerly he was with British Thomas Houston Co. Ltd., sales organization.

Energetic Trip

One of the most energetic export itineraries I have seen this year was shown to me by K. Entwistle, export manager for Poly-Flor flooring. It involves a five month, 45,000 mile world trip. Mr Entwistle will visit 21 countries, from Australia to Italy.

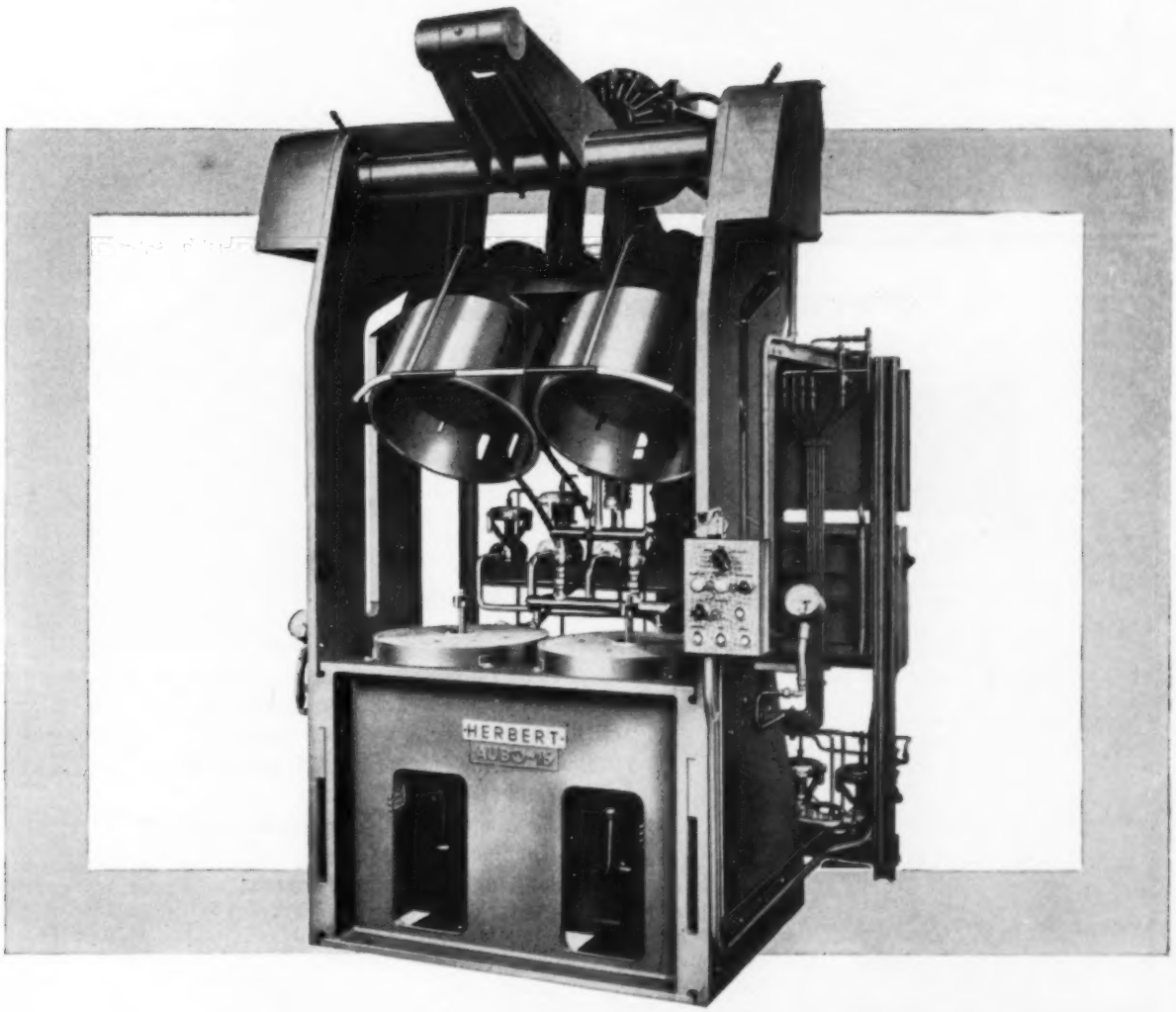
This airline ticket — although not beating the record of 65 sections — is among the largest bought in Manchester this year.

Works Manager in Durban

M. H. Wainwright has been appointed works manager at the Durban factory of Dunlop South Africa Ltd.

Before joining the tyre technical

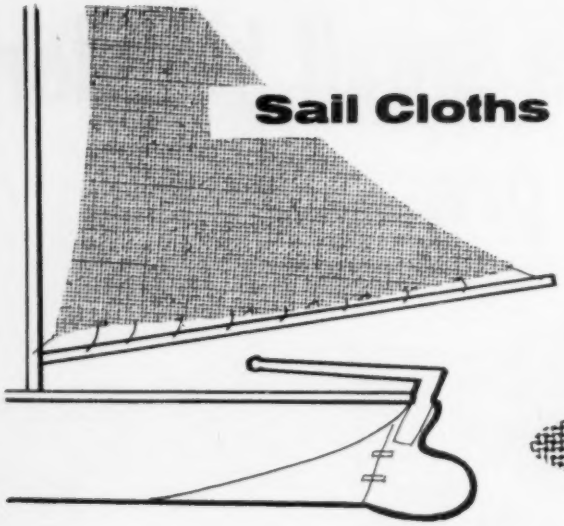
how big should a small bladder tyre curing press be?



The Herbert Aubo 16 is completely new — and purpose built to cure the smaller sizes of tyre economically. No need now to have your heavier machines partially or wholly tied up with tyre sizes below their real capacity. The Aubo 16 is the right machine—*exactly* the right machine—for the job and it has all the built-in brilliance which characterises the renowned Herbert range. Output?—about 160 to 190 tyres per day. Write now for further details to:

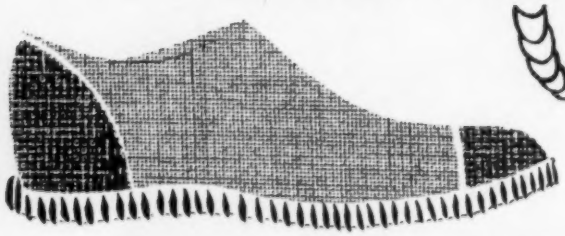
BAKER PERKINS LTD. WESTWOOD WORKS, PETERBOROUGH

BP.111



Sail Cloths

Protective Clothing



Boot & Shoe Materials

Tyre Foundations **Tarpaulin Canvas & Sail Cloths** **Liner & Wrapper Cloths** **Filter Cloths** **Transmission & Conveyor Belting Ducks** **Hose Fabrics** **Boot & Shoe Materials** **Protective Clothing** **Fabrics for Rubberising** **Plasticising and Laminating Purposes** **Printers' Blanket Wigans**

Hay & Robertson

Whatever your fabric requirements or problems consult Hay & Robertson at

St. Margaret's Works, Dunfermline
Telephone: Dunfermline 1
Telegrams: 'HAY' Dunfermline
London Office: 74 Cheapside, E.C.2. Tel: CITY 5901

department at Fort Dunlop in 1955, Mr Wainwright, who holds a planter's diploma, spent eight years in Malaya and Nigeria.

In his new appointment he will be responsible for the production of tyres, Dunlopillo products, industrial belting, adhesives and general rubber goods.

Baker Perkins Appointment

R. H. Wilkins, a joint managing director of Baker Perkins Ltd., has been appointed managing director of Rose Brothers (Gainsborough) Ltd. He will remain a member of the board of Baker Perkins Ltd., and will divide his time between the two companies.

A. I. Baker, chairman of Baker Perkins Ltd., N. Mountain, director, and W. A. B. Brown, deputy managing director of the Forgrove Machinery Co. Ltd., of Leeds, have also joined Rose Brothers board.

Professor Geoffrey Gee (*left*), the first Swinburne medallist, chatting with H. F. Wilson, president of the Plastics Institute, after Professor Gee had delivered the Swinburne Award address at the Royal Institution recently

Floating Factories

A new era in British fishing has started with the development of factory trawlers by Chr. Salvesen and Co. Ltd., Leith. These vessels, the *Fairtry I, II* and *III*, are combined fishing trawlers and floating factories, and at present are operating most successfully.

The hydraulic system of the trawl and the factory decks is an essential part of the process in which freshly caught fish are rapidly transformed into filleted, quick-frozen, catering portions. And for operating this, the ship's owners have chosen the Greer-Mercier Accumulator, the key part of which is a bladder of Hycar nitrile rubber.

The accumulators operate four elements of the systems; the gates at the top of the trawl ramp; the fish hatches between the trawl deck and factory deck; the hydraulic rams on the plate freezing machines, and the ejecting machinery for pressing frozen blocks from the freezer trays. With the help of this hydraulic system, each ship can process about 600 tons of frozen fillets in a two-and-a-half to three month voyage.

Appointments in Brief

Michel Neumand has been appointed sales manager for United Carbon Co.'s new French subsidiary, United Carbon France, S.A., and H. L. Kirchschlager has been made product manager for sales to South America and Mexico. United Carbon has a $5m. carbon black plant under construction near Rouen, which is scheduled for completion this year.

* * *

V. A. Stanley-Adams has joined British Geon Ltd. as an additional representative for Hycar nitrile rubber in the southern sales area. Mr Stanley-Adams will specialize in the use of Hycar in the paper and related industries.

* * *

Denys S. Asbury has been appointed assistant secretary to the Laporte group of companies.

THE LEGAL ANGLE

A True Account

By a Barrister

'Laboratory assistant required. Experience in latex and/or dry rubber manufacture preferred. Reply in writing, stating age, qualifications and experience. . . .' RPW, February 18 1961.

Once upon a time there was an ex-convict, who replied to an advertisement similar to the one above. He gave his age, knowledge and experience of the trade and educational background with complete candour. But he did not mention his little brushes with the law.

He got the job, a senior one, at a high salary. But when the management found out the horrible truth about his past, they dismissed him on the spot.

Criminal Record

'You had no right to keep this matter from us', they said. 'You knew perfectly well that it was relevant when considering your application and you had a duty to disclose your criminal record'.

The executive disagreed — and sued for his salary in lieu of notice.

The case climbed up the ladder of appeals and the employee reached the top, triumphant. The Court held that an employee is under no duty whatsoever to give information about his antecedents.

True, he must not induce his employers to take him on by making any false statement. True, also, there are occasions when silence can itself amount to a misrepresentation. It can indicate a false answer to a question. But, normally, it is no crime to keep silent about matters which you would prefer to forget.

The moral? If you are an employer, it is up to you to ask applicants for jobs all the facts that you want to know about them, and if you want to be doubly sure, of course, you should indulge in a little, inexpensive, fidelity insurance.

Checking Up

The insurance companies will check up for you in a way that you cannot do for yourself — and it will cost you very little. But do not expect results in five minutes. The companies sometimes take weeks.

And if you are an employee, with something to hide? Hide it if you wish; but answer the questions you are asked, fully and truthfully. Do that, and you will get damages should you get dismissed when the truth comes to light.

Polly Ester Says . . .

'Thickness gauge — the 11 plus'

Colours and Coatings

AT THE THIRTEENTH OCCA EXHIBITION

THE thirteenth technical exhibition of the Oil and Colour Chemists Association took place this week at the Royal Horticultural Society's old and new halls.

I.C.I. Ltd. were represented by four divisions — Dyestuffs, General Chemicals, Heavy Organic Chemicals and Nobel — and a wide range of products were displayed. Two new fast green pigments, Monastral 3YS and 6YS and two new chrome pigments in the Supra brand class with improved weathering properties were included in the Dyestuffs division display. General Chemicals featured Alloprene chlorinated rubber used as a basis for many paints, for rubber-to-metal bonding and as a modifier for synthetic rubber and other adhesives. Also in the I.C.I. exhibit were aromatic acids of interest to alkyd and polyester resin manufacturers, novel phenolic resin intermediates and the new Methofas cold water soluble cellulose ethers were introduced. These are used as thickening, dispersing and binding agents particularly in emulsion paints and paint removers.

New Resins

The main features of the Goodyear Tyre and Rubber Co. Ltd. stand were two new resins. Pliolite AC is an addition to the range of standard Pliolite resins and is claimed to have long life and durability. Vitel PE 200 has been developed for solution-coating applications and is a high molecular weight linear polyester resin. Films cast from solutions of this material are clear, hard, glossy, durable and non-tacky.

Laporte Chemicals Ltd. and Laporte Titanium had a combined stand and the exhibits included a wide range of organic and inorganic peroxy compounds for initiation of polymerization of paints, surface coatings and allied industrial uses.

A new resin/hardener system for the formulation of solvent free coatings was shown by Ciba (ARL) Ltd. This consists of Araldite GY 250 and Hardener HY 830, and its main advantage is its ability to cure under conditions of high humidity and at very low temperatures without adverse effect on the coating.

Other Ciba exhibits included a range of epoxy resins for all applications such as stoving and cold-curing finishes and stoppers.

Acrylic Finishes

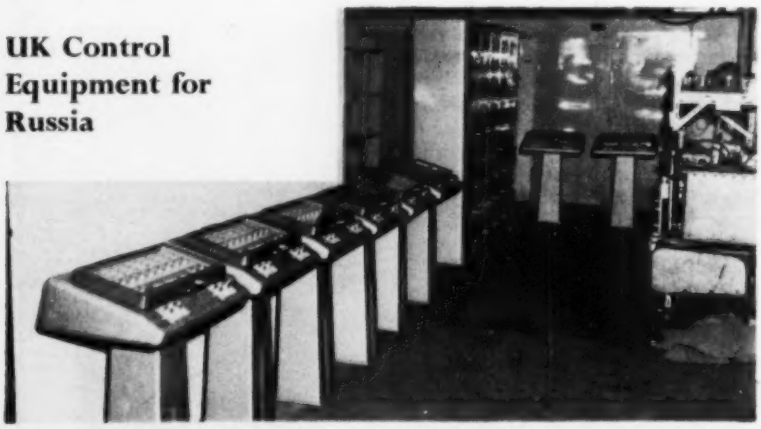
Decorative and industrial finishes based on acrylic copolymers were among the feature of the Vinyl Products Ltd. stand. The Vinamul N6800 range of internally plasticized copolymers of unusual versatility form the base for interior and exterior emulsion paints of high durability, for glaze coats and for highly-pigmented paints. Vinacryl 3000 and Vinalak R3075 are two new acrylic copolymers developed for the production of stoving finishes and as plasticizing resins for use with melamine-formaldehyde resins and/or epoxies.

Omya extenders made by Pluess-Stauffer of Switzerland, including a new material for water thinnable paints were shown by Croxton and Garry Ltd., who also displayed magnesium compounds made by Merck and Co. Inc. of USA. These are for use as thixotropic and depressing agents and as buffering agents in pva and other emulsion paints.

New developments on the stand of Farbenfabriken Bayer AG included a fast-to-light isocyanate Desmodur N, and two Roskydal unsaturated polyesters for the production of coatings with improved flexibility, adhesion and gloss retention. Also shown were an improved iron oxide pigment and a zinc sulphide with a combination of good properties.

The British Titan Products Co. Ltd. stand showed graphically the considerations to be taken into account for optimum results to be obtained in coating formulation by different methods including ball milling, sand grinding, attrition milling and high speed milling and mixing.

UK Control Equipment for Russia



This control equipment for a non-electronic automation system has been designed and manufactured by Gresham Automation Ltd., in collaboration with Courtaulds Ltd., for the control of presses in a tyre cord factory in the USSR. The control system is in the background with the local control pedestals in the front of the picture

Symposium in Scotland

JOINT PLIRI MEETING

A ONE-DAY symposium has been organized jointly by the Scottish sections of the Plastics Institute and the Institution of the Rubber Industry and will be held at the Royal College of Science and Technology, Glasgow, on Friday April 14.

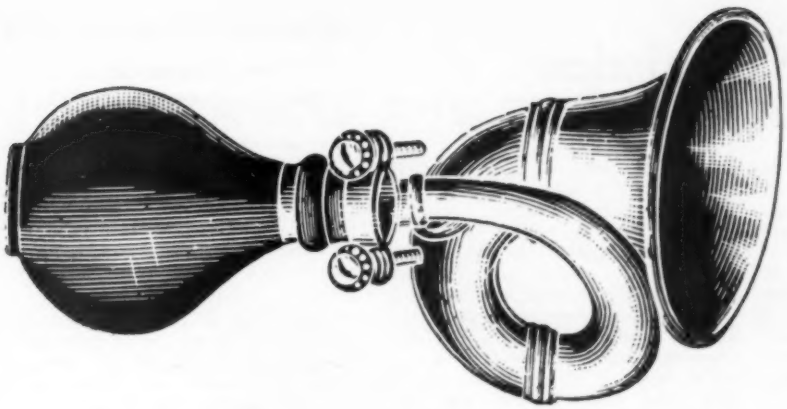
The title of the symposium is 'Some Newer Ideas in Plastics and Rubber' and five papers will be given, details of which are as follows.

Recent developments in silicone rubber, by K. J. Brimley (I.C.I. Ltd.). PVC/Nitrile rubber, by T. J. Sharp and J. A. Ross (BTR Industries). Low pressure polythene as a raw material for fibre manufacture, by Dr Schlimme (Chemische Werke Hüls). General application of polypropylene sheeting, by K. C. Ford (British Celanese). The manufacture and properties of polypropylene film, by R. A. Rose (British Cellophane).

Further details can be obtained from K. Manock, the secretary of the Scottish section of The Plastics Institute, c/o The Geigy Co. Ltd., 36 St. Vincent Crescent, Glasgow, C.3.

Collinson's Engineers

Collinson Engineering is no longer at 17 Bath Street, Syston, Leicestershire. The premises are now occupied by Collinson's Engineers and Mould Makers: directed by James and Harold Collinson, the firm specializes in moulds of intricate pattern and design.



Klaxon—a 6 m.p.h. rarity.

Today, when cars are no longer a rarity, it is not enough to let a car blow its own horn.

With today's competitive market, it requires the power of publicity. Television is the key. It is far and away the most effective medium for actually demonstrating cars and components to potential customers in their homes.

Manufacturers and dealers advertising on Associated-Rediffusion reach over 8 million people in the London area—a prosperous market, proved by the fact that 25% of all car owners in this area purchased their cars in 1959.

And, did you know that 32% of cars in the area are now due for testing? Here is your opportunity to sell the economies of running new cars—your cars.

AGE OF CAR OWNED	Total	Class			
		AB	C	D1	D2E
No. of car owners	336	93	114	90	39
Percentage of cars over 10 years old	32%	20%	27%	43%	49%

Make sure that you capture your share of this market by advertising on television—on Associated-Rediffusion.

These figures are quoted from the London Viewership Survey No. 3, commissioned by Associated-Rediffusion. Eric Laman (Telephone: HOLborn 7888) will be pleased to give you more details of your potential London market.

LONDON

ASSOCIATED-REDIFFUSION

London's Television, Monday to Friday

Television House, Kingsway, London, W.C.2. Tel: HOLborn 7888
also Norfolk House, Smallbrook, Ringway, Birmingham 5. Tel: Midland 9151/2
and Peter House, Oxford Street, Manchester 1. Tel: Central 9867/8

Rubber Statistics

MALAYA — CEYLON — UNITED STATES — JAPAN

MALAYAN rubber exports in January totalled 54,811 tons against 79,512 tons in December, according to official statistics released in Kuala Lumpur.

End-January stocks amounted to 90,537 tons against end-December stocks of 75,133 tons. The end-January figure comprised 66,043 tons in dealers' hands, 18,996 tons (preliminary figure) on estates and 5,498 tons awaiting shipment.

Production was higher at 66,731 tons against 66,190 tons in December. Imports were 4,447 tons against 4,732. Local consumption during January was 530 tons compared with 505 tons in December. Loss in process was 98 tons against 116 tons.

Ceylon

The production of natural rubber in Ceylon in January was 22,962,976lb., according to a report from Colombo.

This total was made up of: sheet 10,562,969lb.; sole crepe 206,667lb.; scrap crepe 4,362,965lb.; latex crepe 7,577,782lb. and latex 252,593lb.

Russia took the largest quantity — 4,534,950lb. — followed by Western Germany with 2,232,758lb. The UK took 1,958,615lb. and USA 2,014,710lb.

United States

Manufacturers' shipments of passenger car tyres during 1960 amounted to 105,799,261 units, the highest recorded shipments in the history of the tyre industry. This represents an 8.62% increase over the previously recorded high of 97,399,444 tyres shipped during 1959.

A sharp increase of 22% in original equipment shipments contributed to this new record high, with 36,319,741 tyres shipped during 1960 as compared with 29,770,496 tyres for 1959. Replacement tyre shipments during 1960 also increased, amounting to 68,534,890 units, 2.54% higher than the comparable figure of 66,840,236 tyres for 1959.

A new high for production was also reached with a total of 105,361,431 tyres recorded for 1960, a 2.60% increase over the previous record high of 102,695,694 units produced during 1959, according to the US Rubber Manufacturers Association.

Japan

The Japanese Rubber Importers' Association has announced that Japan's consumption of crude rubber during January totalled 12,000 tons, compared with 12,500 tons in December. The Association said domestic consumption of crude rubber in February was estimated at 12,000 tons.

The end-January stocks of crude rubber totalled 13,290 tons, compared with 14,250 tons in December, while the end-February crude rubber stocks were estimated at 12,290 tons.

The Japan Rubber Manufacturers' Association has announced that production of rubber articles in January totalled 17,235 tons, compared with 18,719 tons in December.

Rubber article output in tons in December included (January figure in parentheses): motor car tyre/tubes 8,615 (7,847); bicycle tyre/tubes 727 (619); rubber soled-canvas shoes 1,033 (940); rubber shoes 1,410 (1,255); chemical shoes 383 (341); belts 1,152 (979); hoses 487 (497); rubber coatings 482 (480) and industrial uses 2,613 (2,511).

BOOK REVIEW

THE ENGINEERS BUYERS GUIDE 1961. (Published by Morgan Bros. Ltd. 984 pp. price 10s.)

The entries in this guide are limited to firms advertising in *The Engineer* or the *Buyers Guide* itself. These number 1,860 and represent a fairly comprehensive list of suppliers of a wide variety of engineering and industrial products and services.

The buyers guide section itself contains 752 pages with 35,100 entries arranged under 2,700 classified headings with 1,600 cross references. Other sections include details of forthcoming exhibitions, associations and institutions and societies connected with the engineering industry, addresses and UK agents for foreign firms.

The sections on rubber and plastics both contain a large number of firms but the only material mentioned by name is ptfe — apart from this the only division is 'plastic', 'rubber' or 'synthetic rubber'. This is probably the way in which many engineers think of rubber and plastics, but it seems a pity that the information given could not be a little more specific.

∴ Copies may be ordered through the Books Department, RUBBER AND PLASTICS WEEKLY, Maclaren House, 131 Great Suffolk Street, London, S.E.1.

COMPANIES in the NEWS

Northwestern Rubber

The Northwestern Rubber Co. Ltd. has declared a final dividend of 7½% making 12½% for year ended December 31 1960 (15 months December 1959 12½%). Trading surplus was £92,026 (£64,040); net profit £47,669 (£18,735); profit after tax was £8,163 (£5,910). Transfer to reserve was £61,985 (nil), carry forward £12,989 (£44,532).

UAM Group

Frank W. R. Douglas, chairman of the UAM group, in a statement to shareholders published this week, said that the current year showed a continuing demand and a higher rate of production.

He referred to Allied Structural Plastics Ltd., newly formed in equal partnership with Thermo Plastics Ltd., a Tootal subsidiary. There was an increasing demand for plastics in the building industry, he said, and the new company would shortly be manufacturing pipes in all forms, rain water goods, cold water cisterns and many other articles.

Mr Douglas also referred to UAM Plastics Ltd., the sales and profits of which, he said, had increased still further during the year. Further manufacturing plant had been ordered, and would come into operation during the year.

There was a record group profit, before tax, of £726,209 in the 53 weeks ended October 2 1960, compared with £533,265 in the previous period. The meeting will be held on March 23.

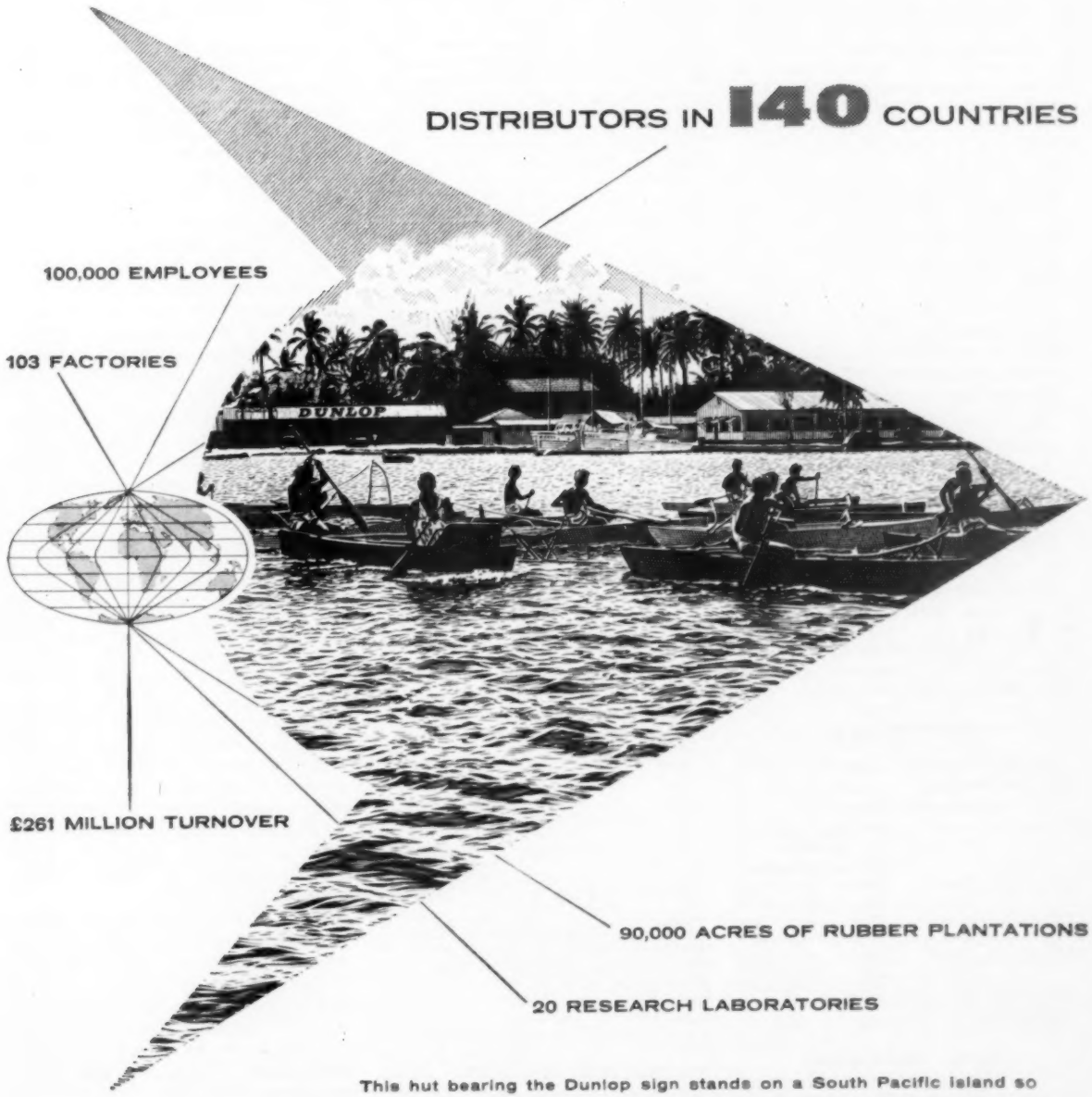
No Stockpile Sales

There were no sales from the Board of Trade's stocks of natural rubber during February; 28,405 tons of rubber remained available for sale.

In Washington the General Services Administration has announced that February sales of crude natural rubber from the national stockpile totalled 528 long tons.

Pumping British Geon's butadiene-acrylonitrile latex into two new storage tanks at the Bridgwater factory of Bonded Fibre Fabric Ltd. The tanks have a capacity of 8,000 gal. Hycar latex is the principal bonding agent used in the manufacture of Solena fabric interlining

BEHIND THE DUNLOP SYMBOL



This hut bearing the Dunlop sign stands on a South Pacific island so isolated that a boat calls only once every three months. But communities everywhere demand Dunlop products and so even in this remote place there is a Dunlop distributor. This depot is one of many hundreds, small and large, covering the world. Recent years have seen such an expansion of Dunlop operations that today there are distributors in 140 countries, providing an increasing range of products and services. Wherever men build, mine, farm and travel, a Dunlop distributor is near at hand to supply their essential needs.

CTH/PR6/56

DUNLOP SYMBOL OF PROGRESS

Rubber Markets

LONDON

An uncertain and mainly dull market was enlivened by renewed short covering, which was increased by demand on German and Dutch account, following the re-valuation of the Mark and Guilder. Prices advanced quickly and gained ¾d. a lb. Interest was diverted from distant to the nearer Terminal positions and sellers became increasingly reserved.

Latest prices are as follows:
No. 1 RSS Spot: 25½d.-25⅝d.

Settlement House:
April 25½d.-25⅝d.
May 25⅝d.-25¾d.
June 25¾d.-25⅞d.
April/June 25⅝d.-25¾d.
July/September 25½d.-25⅝d.
October/December 25½d.-25⅝d.
January/March 25½d.-25⅝d.

No. 1 RSS cif basis ports:
March 24⅝d.-24⅞d.
April 24½d.-25d.
May 24½d.-25d.

Godown:
March 83⅜ Straits cents nominal.

LATEX

Centrifuged 60% latex per gallon in drums, seller, March, April, 14s. 6d., cif European ports. Spot, seller, 15s. 1d. Bulk, seller, d.w. 14s. 3d. Creamed, seller, 14s. 3d. nominal. Normal, seller, March, April, 11s. 11d.

NEW YORK

The New York rubber market ruled as under on March 6:

DEALERS' PRICES

	US cents per lb., ex-dock	
	March 6	Previous
No. 1 RSS, March	29¼a	29b –29¼a
April ..	29¼a	28⅞b–28⅞a
No. 2 RSS, March	29¼a	28⅞b–29¼a
April ..	29¼a	28⅞b–28⅞a
No. 3 RSS, March	29¼a	28⅞b–29a
April ..	29a	28⅞b–28⅞a
No. 1 RSS, Spot ..	29⅛n	29⅛n
No. 3 amber blanket crepe, March ..	24n	24n

FUTURES — REX CONTRACT

	March 6	Prev. Close
March ..	29.50b–30.00a	29.05b–29.30a
May ..	29.40b–29.55a	28.75b–28.85a
July ..	29.20t	28.60b–28.67a
Sept. ..	29.10t	28.30b–28.50a
Nov. ..	28.90b–29.05a	28.30b–28.50a
Jan. ..	28.90b–29.05a	28.30b–28.50a

Sales: 19. Tendency: Firm.

Early dealings in futures were thin on March 6. Prices were steadier as small buying met a scarcity of offerings. Less than ten lots were traded in the Rex contract. The Standard contract was untraded. The physical market was also higher. Small business was reported for March shipment on a C and F basis for sheets Nos. 1 and 2.

SINGAPORE

Quiet conditions prevailed in the morning of March 6. Prices fluctuated within a ½-cent range, interest in lower sheet being confined to threes which were traded quite freely. Offgrades were dull. In the afternoon, prices eased on the publication of the preliminary Malayan rubber export figures for February. Thereafter the market ruled very quiet. There was little inclination to trade. Lower sheets were in little demand.

	Malayan cents per lb., fob Malayan ports to open ports	
	March 6	Prev. Close
No. 1 RSS, March ..	82¼–82½	82⅜–82½
April ..	82½–82⅝	82⅜–82⅝
No. 2 RSS, March ..	81⅝–82⅛	81⅜–82⅛
No. 3 RSS, March ..	80⅝–81⅜	81 –81⅛
No. 4 RSS, March ..	78 – 79	77⅜–78⅜
No. 5 RSS, March ..	68¾–69¾	68⅛–69⅛
No. 1 RSS, Spot ..	81⅞–82⅜	82 –82⅜
No. 3 blanket thick remilled crepe, March	64 –65	64 –65
No. 1 fine pale crepe, March	88 –89	88 –89
2x thin brown crepe, March	63 –64	63 –64

Tendency: Very quiet.

The Industries Syndicate quote latex, native produce, 60% centrifugal, packed in rectangular drums, fob at 162.40d. per gallon.

AMSTERDAM

The Amsterdam rubber market ruled as under on March 6:

	Guilders per kilo	
No. 1 RMA	Mar. 6	Previous
March	2.26½	2.37½
April	2.27	2.38
May	2.27	2.38
June	2.27	2.38
April/June ..	2.27	2.38
July	2.27	2.38

Sales: Nil. Tendency: Steady.

DJAKARTA

Quiet conditions prevailed in the market throughout March 6. A transaction of about four tons of sheet No. 1 for ready delivery was done at 30.50 rupiahs per kilo. There was a quiet tendency at the close.

	Rupiahs per kilo	
	March 6	Previous
Spot No. 1 Priok ..	30.00b	30.00b
Spot No. 2 Priok ..	29.00b	29.00b
Spot No. 3 Priok ..	27.50b	27.50b
No. 1 fine pale crepe, spot	28.00b	28.25b

CEYLON

The price of No. 1 RSS at Colombo on March 6 was 100 (100½) Ceylon cents per lb.

BANGKOK

The price of No. 1 RSS at Bangkok on March 6 was 26.25 (26.50) US cents per lb.

Firestone to Acquire Dayton?

The Firestone Tire and Rubber Co. has disclosed it is in 'the initial stages of looking into' the possibility of acquiring the Dayton Tire Co., a division of Dayco Corp. of Dayton, Ohio.

A spokesman for Firestone said Dayco had approached Firestone with a proposal for the sale of its tyre business. The spokesman said Firestone now has officials in Dayton examining the property.

Details of what the proposed sale would include, and what the price would be, have still to be worked out, the spokesman indicated.

A. L. Freedlander, chairman and chief executive officer of Dayco, disclosed earlier this year that the company, formerly known as the Dayton Rubber Company, might consider disposing of its tyre-making and marketing division. Mr Freedlander cited the stringent competitive factors in the tyre business at that time as a major cause for the company's deficit for the fiscal year ended last October 31.

Avon Project Manager Wins Safety Prize

Lt.-Cdr. G. W. R. Nicholl, project manager, inflatable equipment, at The Avon India Rubber Co. Ltd., has won the 1960 Samuel Baxter Prize for his book 'Survival at Sea'. The prize is awarded annually by The Royal Institution of Naval Architects for 'the best contribution during the year towards safety and efficiency in seagoing vessels'. The prize-winning book covers the history and development of survival equipment with especial emphasis on inflatable liferafts and lifejackets.

While in the Royal Navy Lt.-Cdr. Nicholl was officer-in-charge of the Safety Equipment and Survival Training School at Gosport, and was technical adviser to the Naval Lifesaving Committee. On retiring from the Navy in 1952 he continued development work on pneumatic equipment with two manufacturers before joining Avon to develop a wide range of inflatable yacht tenders.

More Trouble at Speke

More than 3,000 workers at the Dunlop Rubber Co. at Speke, near Liverpool, staged a one-day token strike on March 3, protesting against withdrawal of negotiation procedure.

The workers had resumed work last week after a fortnight's stoppage over a compensation pay claim.

Industry INTELLIGENCE

Technical Data

MS 4 Silicone Compound

A new edition of a leaflet, reference No. C.6, just published by Midland Silicones Ltd., 68 Knightsbridge, London, S.W.1, lists the properties and applications of MS 4 silicone compound.

MS 4, which is non-melting and retains a grease-like consistency from −50°C. to 200°C., has excellent dielectric characteristics, is highly water-repellent and resists oxidation.

Its principal uses are as a dielectric potting material for electronic equipment; as an auxiliary dielectric in ignition systems; as a lubricant on electrical contacts, meter bearings and other mechanisms; to seal electric heating elements, aerial connectors, plugs and sockets against the ingress of moisture; as a preservative to reduce hardening and cracking due to oxidation of natural and synthetic rubber and plastics; to prevent corrosion on battery terminals, leads, spark plugs and other equipment liable to rust or corrode; to prevent the sticking of lamp caps, screw connexions and of switches which may be prone to icing up.

Polysar Krynol 655

Another addition to the range of SBR types available from Polymer Corporation Ltd., has recently been made. The new product is described in Polysar Technical Report No. 11:1B, which may be obtained from Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4.

Polysar Krynol 655 is a cold, oil-extended, butadiene-styrene rubber comparable to SBR 1712C. It contains a highly aromatic oil and a stabilizer of the substituted para-phenylene diamine type. The raw polymer viscosity is 52 (ML-4 at 212°F.), the oil content is 37.5% and the bound styrene content 23.5% by weight of the rubber hydrocarbon.

These components confer easier processing and, in addition to raw polymer stability, improved vulcanizate weather resistance and flex crack growth.

In the report, figures are given comparing the properties of typical tread and sidewall stocks made from Krynol 655 and 651. These show that apart from the longer flex life obtained with the new polymer, the physical properties of both are very similar.

Latex Zinc Stability Time

At the International Rubber Conference in Washington in 1959, the results of extensive zinc oxide stability testing were revealed. Polysar technical report No. 11:1C issued by Polymer (UK) Ltd., Walbrook House, Walbrook, London, E.C.4, describes the results of tests carried out using the procedure described at the conference. A comparison has been made of the stability towards zinc oxide of Polysar Latex 722 and other high solids SBR latices, alone and in blends with natural rubber latex. Such stability tests have been suggested for use in predicting the behaviour of latex in foam rubber gelation.

The tests showed that Polysar Latex 722 was more sensitive to zinc oxide than other high solids SBR latices. In blends with natural rubber latex, all the SBR latices, at some blend ratios, showed more sensitivity than natural rubber alone. Equivalence to natural rubber in zinc oxide stability was obtained at the following SBR levels: Latex 722 78%, SBR 2105 type 56% and modified SBR 2105 45%.

Machines, Materials and Equipment

Electrical Heating Tape

MEI Co. Ltd. of Wolverhampton, has developed a new type of electrical heating tape, called Hotfoil Flat Element Heating Tape. The flat element is said to give a greatly improved heat flow as it lies very close to the object to be heated and heat can flow from the whole flat surface of the element.

This type of silicone elastomer moulding termination is fitted to both type A and type E Hotfoil tapes

These flat elements are made of thin metal foil. Six of them are laid side by side in a 1in. wide tape and they are both individually and collectively insulated with polyester film.

Industrial applications of this tape include the frost protection of factory heating systems, and the heating of almost any type of fluid in pipes, tanks and other containers. Other applications include the curing of adhesives and resins, the heating of laboratory equipment, and the vulcanizing of electric cables such as are used in the mining industry.

The use of polyester film sets a limit to the maximum temperature of the heated object of 110°C. For temperatures up to 450°C. a form of construction is available using only metallic foil and fibre glass.

Publications

Goodyear Marine Fenders

A comprehensive and well-illustrated brochure — the first ever produced — on marine fenders, showing applications, from the smallest dinghy to 2,000 ton vessels, has just been published by The Goodyear Tyre and Rubber Co. (Great Britain) Ltd., Bushbury, Wolverhampton, and is available upon application to the Industrial Rubber Products Department.

Because of its resilience, properly-compounded rubber gives unmatched protection; it absorbs impact, resists abrasion and climate and — unlike conventional materials — it will not deteriorate. Rubber means a *permanent* installation which pays for itself in two to three years by reducing maintenance costs, and then goes on saving money throughout the life of the craft.

As the world's largest makers of rubber fenders, Goodyear can offer a wide range of fully proved products which have been specially developed to meet every marine duty.

MS Buyers' Guide

As a guide to buyers, Midland Silicones Ltd. has listed in convenient form manufacturers of silicone electrical insulants and fabricators of Silastomer silicone rubber components.

The two lists — one for electrical insulating material suppliers and one for silicone rubber processors — are divided into various broad headings, such as 'Cable and Wire', 'Flexible Insulation' and 'Silicone Rubber Rollers'. The headings are then further subdivided, making it easy to find suppliers at a glance.

Leaflet C-19 gives the names of 40 suppliers of silicone electrical insulating materials; leaflet K-11 lists 53 silicone rubber processors. They are available from the company at 68 Knightsbridge, S.W.1.

Goodrich Conveyor Belts

A guide to the correct selection of conveyor belts for food and package handling applications is included in a new brochure published by B. F. Goodrich Industrial Products Co., a division of the B. F. Goodrich Co., Akron, Ohio.

Belts are rated on a selector chart for characteristics such as resistance to abrasion, high temperatures and oil and grease resistance. The publication indicates the colour code used to identify various belts, and the suitability of different belts for tackling different problems.

Future Events

Institution of the Rubber Industry

Leicester Section.—March 15 at the Royal Hotel, Leicester, at 7.30 p.m. 'Rubber and Related Products in the Motor Industry', by R. J. Brown, FIM, AMIMechE (Chief Materials Engineer, British Motor Corporation).

London Section.—March 14 at the Royal Society of Tropical Medicine and Hygiene, Manson House, 26 Portland Place, W.1, at 5.30 p.m. 'The Union of Rubbers and Plastics'. At 7 p.m. 'Light Microscopy of Black-loaded rubber', by C. H. Leigh-Dugmore, BSc, AInstP, AIRI (Dunlop Rubber Co. Ltd.). Also, 'Electron Microscopy of Black-loaded Rubber', by Dr E. H. Andrews (NRPRA).

Manchester Section.—March 13 at Newton Heath Technical College, Manchester, at 6.45 p.m. 'Textiles in Rubber Products Other Than Tyres', by W. Lord, AMCT, ATI (Dunlop Rubber Co. Ltd.).

Merseyside Section.—March 13 at the Exchange Hotel, Liverpool, at 7.30 p.m. 'High Energy Radiation of Rubber and Rubber-like Polymers', by R. W. Pearson, MSc., ARCS (Dunlop Rubber Co. Ltd.)

Midland Section.—March 13 at the James Watt Memorial Institute, Gt. Charles Street, Birmingham, at 5 p.m. 'The Theory of Vulcanization' (a paper for Junior Members), by J. E. Stuckey, BSc, ARIC (Matthew Boulton College of Technology). At 6.45 p.m. 'New Instrumentation Techniques', by a speaker from RABRM.

Preston Section.—March 13 at BTR Industries Social Club, Farington, Preston, at 7.15 p.m. 'Field Reports on Conveyors with Comments', by the National Coal Board.

Scottish Section.—March 14 at the Scottish Building Centre, 425-427 Sauchiehall Street, Glasgow, C.2. Annual general meeting and 'The Vulcanization of Thick Cylinders', by E. C. B. Bott, MSc, DLC, FRIC, MIChemE, FIRI (Anchor Chemical Co. Ltd.).

Plastics Institute

Midlands Section.—March 17 at the James Watt Memorial Institute, Gt. Charles Street, Birmingham 3. 'A Critical Assessment of the Newer Thermoplastics', by J. J. Millane, BSc (Bakelite Ltd.) and J. H. Postans (Joseph Lucas (Electrical) Ltd.).

North-Eastern Section.—March 15 at the Eldon Grill, Grey Street, Newcastle-upon-Tyne, at 7 p.m. 'Electrical Applications of Low-Pressure Resins,' by T. R. Manley, BSc (A. Reyrolle and Co. Ltd.).

North-Western Section.—March 17. Visit to Slazengers Ltd., Horbury, Wakefield.

Second Colour Embossing

Steel pvc laminate sheeting, with applique embossing in a second colour material on the pvc face, has been developed by Radio heaters Ltd.

TRADE MARKS

Objections to the registration of any of the undermentioned applications may be lodged with the Comptroller-General of Patents, Designs and Trade Marks at the Patent Office, 25 Southampton Buildings, Chancery Lane, London, W.C.2, within one month of the date mentioned. The objections must be stated on Trade Marks Form No. 7, cost £2, obtainable through any money order office. The extracts—from "The Trade Marks Journal"—given below are reproduced by permission of the Controller of H.M. Stationery Office.

PLAMONETTE (812,792) Mountings of plastics for model marine engines (not being toys). Kenneth William Siddall, 138 High Storrs Road, Sheffield, 11. To be associated with No. 804,869 (4281, 1110). (Class 7; February 15 1961.)

alphaplex

(803,852) Numerals and letters, all of injection-moulded polystyrene plastics. Jean de Lovinfosse, 78 Avenue Sleeckx, Brussels, 3, Belgium. Address for service is c/o Boult, Wade and Tennant, 112 Hatton Garden, London, E.C.1. (Class 16; February 15 1961.)

QUIL-O-PAD (804,988) Material comprising laminations of sheets of plastics and interlayers of foamed plastics, foamed rubber or rubber composition, cotton waste, paper wadding, or the like, the plastics predominating; and padding and stuffing materials included in Class 17. Maurice Frederick Barrington, Farringdon House, 134-146 Curtain Road, London, E.C.2. (Class 17; February 15 1961.)

PLASTEEPLATE (B809,989) All goods included in Class 17. B T R Industries Ltd., Herga House, Vincent Square, London, S.W.1. (Class 17; February 15, 1961.)

ATTRACTA (805,436) Plastics in sheet form for use as a substitute for glass. Spicers Ltd., 19 New Bridge Street, London, E.C.4. To be associated with No. 385,420 (2131, 128) and another. (Class 17; February 15 1961.)

ESTASOL (809,832) Articles included in Class 17 made of natural or synthetic rubber. Societe Salpa Francaise (a Société anonyme organised under the laws of France), 116 Champs-Elysees, Paris, France. Address for service is c/o Boult, Wade and Tennant, 112 Hatton Garden, London, E.C.1. (Class 17; February 15 1961.)

NEW COMPANIES

George E. Gray (Plastics) Ltd. (683,625).—February 16. Capital: £1,000 in £1 shares. To carry on the business of merchants and distributors of plastic substances, laminated plastic sheets, and of timber and plywood, etc. The directors are: Lewis A. Bayman, Mickle Hey, Danbury Park Home Farm, Danbury, Essex; Edward G. G. Bayman, Fairstead, Great Warley, Essex (both directors of George E. Gray (Hardwoods and Softwoods Ltd.); Geoffrey A. Bayman, Handley Green House, Ingatestone, Essex (all timber merchants). Regd. office: Joinant House, Eastern Avenue, Ilford, Essex.

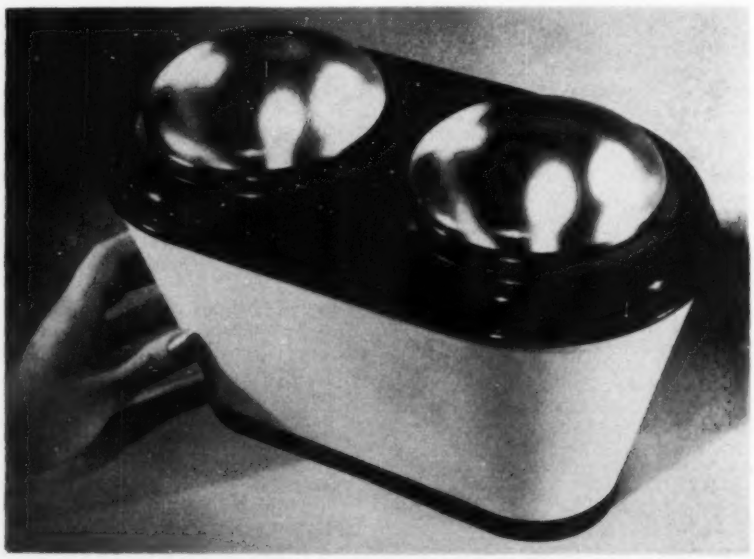
Ewart Plastics Ltd. (683,444).—February 15. Capital: £100 in £1 shares. To carry on the business of manufacturers of and dealers in plastics, and similar materials, engineers, tool makers, etc. The directors are: John H. Ewart, 11B Manson Place, S.W.7 (chairman and managing director of Hildreds (1959) Ltd.); Norman C. Reece, 118 Ringwood Avenue, Croydon; Albert P. Grover; 37 Beaumont Court, Sutton Lane, Chiswick, W.4 (director of Hildreds (1959) Ltd.). Regd. office: Woodside Place, Mount Pleasant, Alperton, Middx.

Becontree Tyre Service Ltd. (683,565).—February 16. Capital: £100 in £1 shares. The directors are: William F. Clogg, 41 Minster Way, Hornchurch, Essex; Mary Clogg. Regd. office: 34 Thameshill Avenue, Romford, Essex.

Dexel Tyre Co. Ltd. (683,166).—February 10. Capital: £25,000 in £1 shares. To carry on the business of manufacturers of and dealers in tyres of all kinds, etc. The directors are: Harry France and Blanche M. France, both of 104 Birley Moor Road, Sheffield, 12; Peter A. France, 10 Sharrard Grove, Sheffield, 12. Regd. office: 1/15 Westbury Street, Sheffield.

Wrington Products (Plastics) Ltd. (683,266).—February 13. Capital: £100 in £1 shares. To carry on the business of plastics engineering, experts welding in all metals, etc. The subscribers (each with one share) are: Dorothy M. Graeme and Paul G. Graeme, both company directors, of 61 Fairview Avenue, Gillingham, Kent. The directors are to be appointed by the subscribers.

Hill Mould Equipment Ltd. (683,202).—February 13. Capital: £5,000 in £1 shares. To carry on the business of manufacturers of and dealers in moulding materials and equipment of all kinds, etc. The directors are: Percival C. J. T. Kirkman, 103/9 Queen Street, Sheffield, 1; Robert E. Kay 616 Abbey Lane, Ecclesall, Sheffield, 11. Regd. office: 103/109 Queen Street, Sheffield, 1.



Shell Carlona P polypropylene has been used for the casing of the Infralux combined lamp and heater manufactured by Selex Electrical Ltd. This unit houses two infra-red lamps which provide light and heat and is especially recommended for bathrooms

CLASSIFIED ADVERTISEMENTS

RUBBER AND PLASTICS WEEKLY

APPOINTMENTS VACANT

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ENGINEER wanted to assist in development work at rubber and plastics factory. Age 23/27 preferred, with drawing office or machine shop experience. O.N.C. or studying. Factory now in Hertfordshire but accommodation available when move to East Anglia completed late 1961.—Details of qualifications, experience, and salary required to Box 856. (856)

EXPERIENCED rubber works foreman (nights). Good pay and prospects.—Apply Sam Kay Rubber Co. Ltd., Hope Mills, Portwood Place, Stockport. (876)

LABORATORY assistant required, preferably with experience in rubber technology for post in laboratory engaged on adhesive development.—Reply to Chief Chemist, John Dickinson and Co. Ltd., Home Park Mills, King's Langley, Herts. (881)

MATERIAL control chemist with experience in the rubber industry required to take charge of mixed staff engaged on testing of raw materials, intermediate and finished products. The wide range of products manufactured in this factory provides varied and interesting work. Applicants should be of A.I.R.I. or equivalent standard.—Apply to Chief Chemist, Greengate and Irwell Rubber Co. Limited, Irwell Works, Ordsall Lane, Salford, 5. (877)

OPPORTUNITY occurs offering excellent prospects with Home Counties rubber manufacturers for energetic and enterprising individual as assistant to managing director. Experience and knowledge of rubber industry in relation to manufacturing and merchanting sales, purchases, correspondence and progressing an advantage.—Apply with full details of experience, age and salary required in strictest confidence to Box 884. (884)

STAFF APPOINTMENT

DESIGNER AND FITTER ENGINEER OF HOSE COUPLINGS

A vacancy exists for a new staff appointment with an old-established and progressive rubber hose manufacturer in Hertfordshire as a fitter engineer for designing and supervising the assembling of low pressure and high pressure cotton and wire braided hose couplings, and other hose fitting work.

Excellent prospects for staff promotion.

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BTR

The expanding research and development programme necessitates the appointment of two

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The successful candidates will be responsible for fundamental work on rubber and plastics processes, for the development of prototype equipment and for pilot plants.

Applicants should have practical training and an Honours degree in engineering, but above all possess an enthusiastic creative mind which will have demonstrated a successful record of invention and design. Experience in a process industry, preferably in plastics or rubber, will be an advantage.

High salaries commensurate with qualifications and experience, exceptional promotion prospects.

Tabulated career details in confidence to:—

Group Personnel Officer (Ref. K/DE),
BTR Industries Ltd.,
Herga House, Vincent Square, S.W.1. (887)

EXPANDING plastics company mainly engaged in extrusion has a number of vacancies for operatives with plastic experience, preferably in extrusion shift work. Good rates of pay. Works being transferred in approximately 9 months to country district. Housing assistance can be given.—Write giving details of experience to Stewarts and Lloyds Plastics Ltd., Drayton Road, Boreham Wood, Herts. (864)

SENIOR rubber technologist. Applications are invited from suitably qualified rubber technologists with extensive experience in all aspects of rubber thread manufacture. Salary in line with experience. Superannuation scheme.—Apply giving full details of experience and salary required to Personnel Officer, David Moseley and Sons Limited, Chapelfield Works, Ardwick, Manchester. (891)

THE DISTILLERS COMPANY LIMITED

PUBLICITY ASSISTANT

The Plastics Group of The Distillers Company Limited wish to appoint a Publicity Assistant in the Publicity and Information Department at their London Head Office.

The successful candidate will in the first instance be engaged on publicity work covering one of the ranges of materials manufactured by the Group. He will be expected to prepare publicity material for the Press and other media, collecting and using information from both inside and outside the organisation—and also to collaborate closely with advertising agents.

Candidates for this post, preferably aged not over 30, must have an ability to write convincingly, having a genuine feeling for words and language. They must also be men of energy and positive personality who can maintain sympathetic contact at all levels. Some previous experience in advertising and/or publicity and/or writing is required, together with some evidence of organising ability. Candidates who also possess a knowledge of plastics will be preferred. Graduate qualifications in arts or sciences would be an advantage.

Write
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21/22 BOLTON STREET,
LONDON, W.1.

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in the Development Department of their Walker Works, Newcastle upon Tyne, initially as Assistant and Deputy to the Development Manager with the prospect of early promotion to a position of more complete responsibility.

It is essential that the holder of this appointment should have a very good technical qualification, a wide theoretical knowledge of the chemical and technological aspects of natural rubber, synthetic elastomers and thermoplastics employed in the manufacture of rubber belting, hose and allied mechanical products. He must also possess extensive practical experience of the processing and manufacturing techniques involved, and have previously held at least one appointment in which he has demonstrated his ability for constructive handling of new problems and product designs. The successful applicant will combine with these skills the personality to lead a well-qualified team and the enthusiasm and inventiveness to make advances in an already highly developed range of products.

A man is required able to justify a substantial initial salary, rising on assumption of the greater responsibilities to which this appointment is intended to lead.

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The Angus Group now employs 3,500 people and operates four separate works and extensive sales organisations both at home and overseas.

Applications should be made in writing, giving details of age, qualifications and experience to General Manager, George Angus and Co. Ltd., Walker Works, St. Anthony's, Newcastle upon Tyne, 6. (879)

SENIOR compounder required to act as group leader within technical department of company in East Midlands engaged in manufacture of rubber and plastics products for engineering and other applications. The position involves control of existing compounds, development work and evaluation of new materials, and calls for a progressive outlook. Applicants should hold a science degree or equivalent and be preferably aged 30-35 and have several years' experience in the industry. Pension scheme and all welfare services.—Apply in first instance to Box 885. (885)

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(continued)

MANUFACTURERS of roughing machines for rubber sheeting, sponge rubber, splitting machines, leather cloth plant, embossing plates and rollers, spreading machines and presses.—G. L. Murphy Ltd., Imperial Works, Menston, Nr. Leeds. (238R)

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PLASTIC injection moulding machine. Windsor 6oz. model SH6.—Fred Watkins (Engineering) Ltd., Coleford, Gloucestershire. Phone Coleford 2271/5. (863)

STEAM-HEATED rubber vulcanizing oven, 4ft. dia. x 6ft. long, in first-class condition.—Box 358. (358)

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April 5th to 14th, 1961

A short full-time course in Practical Rubber Technology will be held from April 5th to April 14th.

The course will include instruction in the handling of natural and synthetic rubbers, including mastication, mixing, calendering, extruding, spreading, moulding and vulcanisation; tension and compression stress-strain tests, tear abrasion and flexing resistance, resilience, hysteresis and low temperature testing. Practice in latex compounding and fabrication will also be provided for those desiring it.

The fee for the course will be £6 10s. Accommodation is strictly limited and early application is advised.

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INDEX to ADVERTISERS

	Page
Abrasive Developments Ltd.	—
A.E.W. Ltd.	—
Allcock, J., & Sons Ltd.	—
Amalgamated Oxides (1939) Ltd.	—
Anchor Chemical Co. Ltd.	xii
Anderson, Joseph, & Sons Ltd.	—
Armour Hess Chemicals Ltd.	—
Ashley Associates Ltd.	—
Associated-Rediffusion Ltd.	399
Astor Boisselier & Lawrence Ltd.	—
Baker Perkins Ltd.	395
Barfoot, T. W., & Webb, W. F.	—
Barwell Engineering Ltd.	—
Belgrave Industries (Exports) Ltd.	x
B.I.P. Chemicals Ltd.	—
Birch, Singleton, W., & Sons Ltd.	—
Boston Marine & General Eng. Co. Ltd.	—
Bridge, David, & Co. Ltd.	385
Bright, John, & Bros. Ltd.	Cover ii
British Electrical Development Association	—
British Geon Ltd.	—
British Nylon Spinners Ltd.	—
British Recovered Rubber Co. Ltd.	iii
British Resin Products Ltd.	—
British Titan Products Co. Ltd.	386
Bush Beach & Segner Bayley Ltd.	—
Cabot Carbon Ltd.	—
Carter Bros. (Rochdale) Ltd.	—
Carlton Press Knives Ltd.	—
Chance & Hunt	—
C.I.C. Engineering Ltd.	—
Cleggswood Oil Distillery Ltd.	—
Cohen, George, Sons & Co. Ltd.	—
Columbian International (Gt. Britain) Ltd.	v
Consolidated Zinc Corporation (Sales) Ltd.	—
Corrosion Exhibition	—
Crosfield, Joseph, & Sons Ltd.	—
Croxton & Garry Ltd.	—
Derrick Davis Plastics Ltd.	—
Dietzel, Hugo	—
Dixon, T. H., & Co. Ltd.	i
Docker, John, & Co. (Engineers) Ltd.	373
Dunlop Rubber Co. Ltd.	401
Du Pont Co. (United Kingdom) Ltd.	—
Durham Raw Materials Ltd.	—
Economist Intelligence Unit Ltd., The	—
Ellison, George, Ltd.	ii
English Clays Lovering Pochin & Co. Ltd.	—
English Electric Co. Ltd., The	—
Esso	388, 389
eur-O-matic	—
Fawcett Preston & Co. Ltd.	—
Ferguson, A. O., & Co. Ltd.	viii
Ferguson, James, & Sons Ltd.	—
Ferguson Shiers Ltd.	—
Firestone Tyre & Rubber Co. Ltd.	—
Foamair Ltd.	—
Geigy Company Ltd., The	Cover i
Goodyear Tyre & Rubber Co. Ltd.	—
Greeff, R. W., & Co. Ltd.	vii
Gresham & Craven Ltd.	—
Gummi und Asbest	—
H. F. Industrial Services Ltd.	—
H. K. Import & Export Ltd.	—
Halsteads Engineers (Leyland) Ltd.	—
Hankin, Geo., & Co. Ltd.	—
Hardman & Holden Ltd.	—
Hatcham Rubber Co. Ltd.	viii
Hay & Robertson Ltd.	396
Hilton, Wallace, & Co. Ltd.	—
Hubron Rubber Chemicals Ltd.	—
Hughes & Hughes Ltd.	x
Hunt Heat Exchangers Ltd.	—
Iddon Bros. Ltd.	iv
Iliffe Industrial Publications Ltd.	—
Imperial Chemical Industries Ltd. (Billingham)	—
Imperial Chemical Industries Ltd. (Dyestuffs)	340, —
Imperial Chemical Industries Ltd. (Plastics—Alkathene)	—
Imperial Chemical Industries Ltd. (Terylene)	—
Institution of the Rubber Industry	—
International Corporation Ltd.	—
International Synthetic Rubber Co. Ltd.	377
Ioco Ltd.	—
K. W. Chemicals	407
Kautschuk und Gummi	—
Kendell, T., & Sons Ltd.	—
Ketjen Carbon	—
Lankro Chemicals Ltd.	—
Laporte Titanium Ltd.	—
Latex Engineering Co.	—
Lavino (London) Ltd.	—
Leaver, Donald Ltd.	—
Leeds & Bradford Boiler Co. Ltd., The	—
Lindsay & Williams Ltd.	x
Lonabarc Ltd.	—
Londex Ltd.	—
London & Scandinavian	—
Lord, R., & Sons Ltd.	—
McKechnie Bros. Ltd.	—
Maclaine, Watson & Co. Ltd.	—
Mersey White Lead Co. Ltd., The	—
Metal Box Co.	—
Micafine Ltd.	ix
Monsanto Chemicals Ltd.	—
Muehlstein, H., & Co. (London) Ltd.	—
Muller, Max	—
National Rubber Bureau	—
Nederlandsch Verkoopkantoor Voor Chemische Producten N.V.	—
New Conveyor Co. Ltd.	—
Noble Lowndes Pension Service, The	—
Northwestern Rubber Co. Ltd.	vi
Novadel Ltd.	—
Oswald & Duncan Ltd.	vi
Philblack Ltd.	374
Phoenix Rubber Co. Ltd.	—
PLA—MA Ltd.	—
Planters Engineering Co. Ltd.	—
Polymer (United Kingdom) Ltd.	383
Preston Tyre Fabric Manufacturing Co. Ltd.	vii
Price's (Bromborough) Ltd.	—
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Smith, Wilfrid, Ltd.	xi
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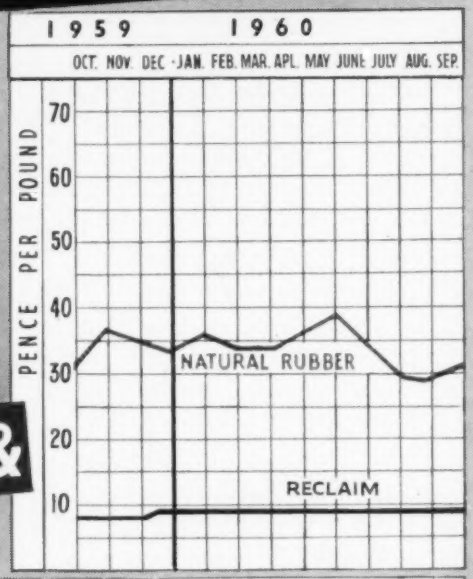

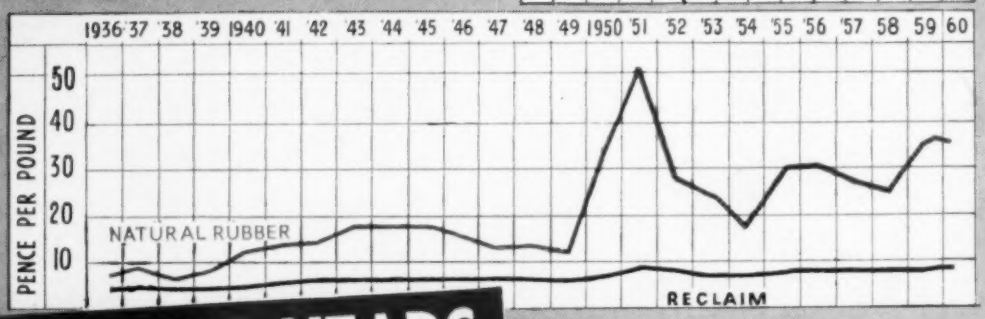

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